THE

Malayan Agricultural Journal.

MARCH, 1935.

EDITORIAL.

Fruit Production in Malaya.

One is apt to overlook or to minimise the value of the fruit industry in Malaya on account of the fact that, apart from pineapples, it is an internal trade; its extent or value, therefore, does not appear in trade returns, and it is extremely difficult to obtain sufficiently accurate statistics from which to construct a review of the position.

Two articles, however, have appeared in the pages of this Journal, summarising, as a result of exhaustive enquiries, the position of this industry in Malacca and Pahang. They give an insight into the value of the industry in these areas, the organisation which has grown up in the marketing of surplus produce—often from somewhat inaccessible holdings—and the possibilities which exist, in certain districts, for increased production.

There are, however, other areas in Malaya where fruit production is of considerable value. Evidences of this are to be found in the reports of Field Officers of the Department. For instance, it was estimated that the exports of bananas from one district in Johore to Singapore amounted to 50 tons a week. The annual value of this crop from this particular district alone would be about $50,000. During the height of the fruit season, in another sub-district, 20,000 durians were exported to town centres daily. The value of this crop for the district in the one season probably amounted to $50,000. Examples of this description might be multiplied, proving the value of the fruit crop, which after rubber, or coconuts in certain districts, is probably the most valued money crop amongst small-holders.

The fruit in most general use amongst Asiatics is the banana. Other fruits possibly enjoy a greater popularity, but can be obtained only during short seasons, whereas the banana is a cheap fruit and is obtainable throughout the year. There are now 23,000 acres under this crop, of which 9,000 acres are in the Federated Malay States and 13,000 acres in the State of Johore. Recent reports from the Districts indicate that the demand from the big towns is such that the prospects are favourable for extending the planted areas.

Pineapples are the only fruit exported from Malaya. The amount of canned pineapples exported in 1934 was 66,634 tons (approximately 2,073,000 cases of 48 tins each), valued at over $7,027,000. We shall in a future number return

to the subject of the pineapple industry. Legislation has been enacted locally to ensure strict supervision of the conditions under which pineapples are canned in this country. It is hoped that agreement between growers, packers and exporters may result in the export of a more standard product which should result in the retention of the valuable markets already developed, and in the introduction of Malayan pineapples into new markets.

By the courtesy of H.M. Stationary Office, who are the holders of the Copyright, we are able to give extracts from a recent publication which summarises the present position of the pineapple markets.

The present number of this Journal is almost entirely devoted to an account of the fruits of Malaya. It has been prepared largely from the publications of the Department, some of which are out of print, while new material has been incorporated so that it presents a statement of present-day fruit production in this country.

Original Article.

MALAYAN FRUITS

Pineapples, Bananas and Miscellaneous Fruits.

Distribution.

With the exception of pineapples, fruit cultivation in Malaya is of little more than local importance. The total area in Malaya under fruit, other than pineapples, is estimated to be 61,000 acres, of which 23,000 acres are bananas. This area does not take into account the numerous small compounds surrounding Malay homesteads, in which a few fruit trees are planted and which in the aggregate amount to a very considerable area.

Although certain fruits acquire a reputation in particular localities, the distribution of the fruits is scattered throughout the country. For instance, North Johore is noted for its durians, Malacca for dukus, Penang for rambutans, but in point of fact, equally good quality fruit of these kinds can be found in other areas.

The most important centres of pineapple production at the present time are Singapore Island (9,500 acres), Johore (43,000 acres) and Selangor (8,000 acres). The total area under this crop in 1933 was about 65,000 acres, of which 21,000 acres were cultivated as a sole crop and the remainder as a catch crop, generally in conjunction with rubber.

The total area in Malaya under cultivation with bananas exceeds 23,000 acres, of which 13,000 acres are in the Unfederated Malay States (Johore 8,000 acres and Kedah 5,000 acres) and 8,750 acres in the Federated Malay States (Negri Sembilan 3,250 acres, Perak 2,500 acres, Selangor 2,000 acres). There are only 1,300 acres in the Straits Settlements, of which 700 are in Penang Island.

Of the total planted area of bananas in 1933, only about 1,300 acres were planted as a sole crop, the remainder existing as a catch crop with other forms of cultivation.

PINEAPPLES.

The Malayan pineapple canning industry was founded about 1888, when factories were opened by Europeans in Singapore. Within two or three years, ownership appears to have been transferred to the Chinese and there were at that time several small canning factories in Singapore and Penang. The latter port, as a centre of cultivation and canning of pineapples, was never of great importance, but in Singapore, the industry became well established and later extended to the State of Johore. The importance of Johore in this respect has been largely due to the development of that State for rubber cultivation with which pineapples are grown as a catch crop, and to the fact that the area of land in Singapore available and suited to the cultivation of pineapples is limited and has decreased.

The bulk of the crop is used for canning purposes. The extent of production may be seen by an examination of the official returns of exports from Malaya. The annual exports stood at an average of about 20,000 tons from 1904 till 1916. A rapid decline in the trade followed for the next three years. Thereafter, owing largely to the very considerable extension of rubber planting which took place in southern Johore, there followed a corresponding increase of the planting of pineapples as a catch crop. Consequently, exports of the canned product steadily and rapidly increased, and appear not yet to have reached their ultimate peak. The check in the upward trend of exports which occurred in 1926 and 1927 coincided with the activities of canners who formed a combine to fix prices. The lower exports in 1933 were definitely the result of disagreement between growers and canners as a result of which many of the former destroyed part of their crop in an attempt to raise fresh fruit prices.

In addition to the cultivation of pineapples for the very important canning trade, areas exist in many parts of the country for the production of the fruit for dessert purposes. The total area planted for this purpose probably amounts to about 2,000 acres, the produce of which is consumed locally.

Varieties.

The variety most commonly grown for canning is a type of pineapple which is very similar to the "Red Jamaican" or "Spanish Pine" of the West Indies. The fruit is small, weighing from 3 to 5 lbs., and has an excellent flavour when canned. The "Mauritius", and the "Smooth Cayenne", or "Kew Pine" are chiefly grown for dessert purposes. A number of other varieties are under cultivation on an experimental scale at the Central Experiment Station at Serdang in Selangor and at the Pineapple Experiment Station, Singapore, where experiments are also being conducted on selection and breeding of pineapples with the object of improving the quality and reducing the depth of "eyes", as deep "eyes" in the fruit result in considerable waste in cutting for canning purposes.

System of Production.

Many of the owners of pineapple canning factories own land upon which they have planted pineapples. In some cases the owner undertakes the entire responsibility of planting and bringing the area into production. On the other hand, many areas are worked on a system whereby the Chinese owner arranges with a number of Chinese squatters to plant up his land with pineapples and to keep it clean for an agreed charge per acre per month. Each squatter is thus definitely and absolutely responsible for a portion of the estate, and generally erects his own temporary abode thereon. The agreement usually provides that the squatter shall get 50 per cent. of the value of the pineapples as a bonus after cartage costs have been deducted, and the agreement as a rule contains a clause which provides for the payment to the squatter of a sum of money per acre for clearing the pineapple plants from the land after five years.

Climate.

The well-distributed and heavy rainfall of Malaya renders this country particularly suitable for pineapple cultivation. The equatorial conditions are responsible for the fact that two main crops are harvested annually instead of one big crop and one small crop as occurs in latitudes further from the equator. Even in Malaya, however, the January crop is decidedly smaller than the June crop.

Soils.

Pineapples will grow on a wide range of soils, but favour the medium type of soil with good soil aeration and drainage. For this reason also, gently sloping lands are to be preferred. These conditions are met with on the majority of the inland areas, wherever topography lends itself to free natural drainage. In particular, the quartzite soils, and the granite soils are known to be suitable. Pineapples are also grown in Malaya on peat soils. In some cases, pineapples have been cultivated by Europeans on newly opened peaty land destined for rubber, less with the idea of profit from the fruit than for the favourable effect pineapple plants are said to have in improving the condition of such soils.

Until recently, it has been the custom to cultivate pineapple in Malaya either on newly-opened jungle land, on land which has been out of cultivation for a number of years, during which period it has reverted to secondary jungle conditions, or as a catch crop with rubber.

Planting Material.

Pineapple planting material is of four descriptions: *viz.*, ratoons which are formed from buds on the stem among the roots; suckers formed in the leaf axils; slips formed from buds appearing immediately below the fruit; and crown slips and crowns, formed from buds beneath and around the crown of the fruit. Ratoons and suckers are very suitable for planting purposes, as they produce fruit earlier than do the less strongly-developed slips, but slips (suckers) from buds below the fruit are used almost universally as planting material in Malaya, owing to the fact that these slips are produced in larger numbers, are uniform in size and age, and cost less to transport.

A recently introduced method of propagation originated in Trinidad has for its object the production within a short time of a large number of uniform plants of a variety *. In this method cross sections 1/5 inch in thickness are cut from the mature aerial stem and rhizome which has been stripped of its leaves, roots and scales. The sections are placed in a 5 per cent. solution of potassium permanganate for five minutes, the solution drained off and the sections air-dried for two days. The sections are then planted horizontally in boxes and kept in the shade. The dormant buds commence to grow a month

* Plant Propagation by E. A. Walters. *Tropical Agriculture* Vol. IX, No. 2, 1932.

after planting and may be transplanted to beds when two months old. When sufficiently developed, the plants are separated and planted in the field.

This method has been tried experimentally in Malaya, but it is too early to state to what extent it is adaptable under estate conditions, though for the multiplication of new or rare varieties it possesses undoubted advantages.

Planting in the Field.

In Malaya, single row planting is the usual method adopted and plants are usually spaced in the field 5 feet by 2½ feet, with a six-foot path at every 100 feet. This spacing gives from 3,000 to 3,400 plants per acre.

Suckers, slips, and ratoons for planting are cut square at the base, the lower leaves are removed, and the planting material dried in the sun for a while before being planted.

The plants are placed from three to four inches in the ground, the actual depth depending upon the size of the plant. Care is taken that no soil or sand enters the bud as it will kill the plant, or at least retard its development.

After planting, the fields are periodically weeded, but apart from this operation, and the earthing up of the plants and removal of excess buds, no further cultivation is usually given in Malaya.

Yields.

The first crop is harvested about 18 months after planting, from 1,200 to 1,500 fruits per acre being obtained. Thereafter, for a further 3½ to 4 years, two crops are reaped annually, *viz*: in May, June and July and in January, February and March, although a small amount of fruits are coming in all the year round. After the crop is in full bearing, the first four crops may give 4,000 to 5,000 fairly large fruits per acre, per annum, followed by three or more crops smaller in number and poorer in quality.

The economic life of the plant under Malayan conditions depends upon whether it is cultivated as a sole or as a catch crop, and even then is still open to doubt. Under sole-crop conditions present opinion is veering to a system of more frequent re-planting, and application of artificial fertilizers at regular intervals.

The fruit for canning is either sold by the growers (if they are not also owners of factories) to the canneries at the factory door, or on the road-side, and is also purchased by drivers of passing lorries at road-side for re-sale to the factories.

Catch Crop *versus* Sole Crop.

Until very recently the pineapple canning industry has been maintained from supplies grown as a catch crop, generally in conjunction with rubber planting. This system was worked successfully by the Chinese for a number

of years and proved most remunerative, especially at a time when the canned product commanded a much higher price than it does in the present depressed state of markets.

About the year 1930 it was realised that, if the market for Malayan pineapples, which had by then grown to some importance, was to be maintained or further developed, consideration must be given to the question of the production of the fruit as a more permanent crop. There was already an easing-off in the area of land newly planted with rubber and suitable land for development by this method was not inexhaustable. Furthermore, the Malayan Governments closed their books against further alienations of land for rubber planting and the number of alternative crops to rubber as the main crop were very limited.

It was realised that the change of policy would entail departure from the somewhat haphazard customary method of cultivation. The new system would necessitate more cultivation, manuring and consideration of closer planting distances and of rotation of crops. These questions are being studied by the Department of Agriculture in Singapore, Johore and Serdang and also by the growers. The introduction of rubber regulation, a feature of which is the prohibition of further planting of rubber has rendered the problem urgent. In 1934, one-third of the total area of pineapples in Malaya was planted as a sole crop.

Canning.

Factory methods for canning pineapples differ considerably in Malaya from those employed in other countries. Whereas in modern packing methods, machinery is used as much as possible, in Malaya, hand-labour, owing to its relative cheapness, is usual for almost all the operations. The local canning pineapple is not suitable for mechanised peeling and slicing operations, unless control of size and type of fruit is established by packers. Under Malayan conditions, factories are at no great distance from the sources of supply of the fruit, thus reducing transport costs. The preparation of the fruit for packing is done by hand-labour, and the cans are made in the factory, each factory being equipped with the necessary machinery for this purpose. This latter fact contrasts with the system adopted in competing countries of production, where the cans are purchased from a central can-making factory.

The fact that by the Malayan method, transport of fruit and empty cans is reduced to a minimum, has its advantages. Factory-produced cans are dearer than those produced in the canneries by the Chinese employees. The fruit can be harvested in a riper condition than would otherwise be possible; factory methods are such that generous use can be made of labour, which is comparatively cheap; and freight, which is comparatively expensive, is reduced to a minimum. On the other hand, the packer has but little control over the quantity or quality of his fruit supplies, which is a definite disadvantage.

The question of power must also be considered in connexion with the situation and size of the factory and of the amount of machinery employed. The factory in this country is usually of a comparatively temporary nature and in many cases situated at a distance from a cheap or convenient source of electrical supply. The usual unit is such that the power can be supplied by an engine of 30 to 40 h.p. which is sufficient for a factory turning out from 1,000 to 1,500 cases per day.

The capacities of the Malayan factories vary considerably. During the season the factory may work night and day, and it is on this basis that capacity is estimated. The largest factory can turn out about 3,000 cases of 48 tins per case per day; the average factory has a capacity of about 1,000 cases per day.

The operation of preparing the pineapples for canning needs little description. Canned pineapples are exported either as slices, cubes or crushed. Whole pines may be exported to fill a special order. Pineapple cores have recently been canned. The work is done by hand at long tiled tables, the operator, wearing suitable clothing and a rubber glove, performing the cutting operation with a knife something akin to a chopper. The waste of fruit due to peeling, coring and removal of the "eyes" is considerable; with "sliced" fruit it amounts to about 30 to 40 per cent., and with "cubes" the waste is between 60 and 70 per cent. of the fruit.

While cutting the fruit, the operator grades the product. Fully ripe fruit of good quality is put aside and is destined for export as "Golden"; the remainder, excluding very irregular pieces and very unripe fruit, is packed as G.A.Q. (good average quality). The rejects from this grade are classed as No. 2 and are sold only on the Far Eastern market.

A considerable space in the factory is devoted to the manufacture of the cans. These are made from tin-plate which is imported in sheets for the purpose.

The sheet-tin is cut into strips in a shearing machine, the strips being of convenient size for further cutting of body blanks and strip stock for tops and bottoms. The bodies are made by passing through a body forming roll, and a flanger. The bodies are then put together and soldered by hand. The tops and bottoms are stamped out and affixed to the body in a machine known as a double seamer. The tin is filled with fruit and the top fixed with a seamer. No solder is used for fixing the tops and bottoms; a thin strip of rubber is placed round the lid, which when flanged hermetically seals the can.

The cans are filled with fruit and removed to syruping trays, where a syrup made from cane sugar is added until the cans are completely filled. They are then removed to the seaming machines and capped.

The amount of sugar used varies with the product and the market for which it is destined. The natural sugar content of Malayan pineapples as canned is usually taken to be 11 per cent., though if the fruit is fully ripe it may be as high as 17 per cent. About 90 per cent. of the canned pineapples from Malaya are packed with the addition of cane sugar, giving a total sugar content of from 20 to 25 per cent.

The sealed cans of fruit are cooked for approximately 30 minutes at a temperature of 212°F., after which they are stored in a cooling chamber and packed for export, either labelled or without labels depending upon the specification of the particular order.

Canned pineapples are packed in cases of *serai* wood or of three-ply wood. The former is cheaper and it is stated that it is used for nearly 70 per cent. of Malayan exports.

The usual packing allows 1½ lbs. of fruit per can, forty-eight such cans being packed in a case. For a case of canned pineapples, about seventy-five fresh fruits are required.

By-Products.

Only about one-third by weight of the pineapples received in the factory is utilised. The resultant large quantity of waste is frequently a source of embarrassment, especially if the factory is within a municipal area.

The economic disposal of waste has been investigated. It is found that, as a preliminary to its disposal, pressing and grinding are necessary. Incineration of the solid portion for the production of an ash possessing valuable manurial properties has been suggested, the liquid portion being used as a source of alcohol. Pineapple bran, used as food for cattle can be prepared and has already been marketed in Hawaii. A third method of disposal is to return the partially dried residue to the field and to spread it in shallow layers.

None of these methods has been employed to any extent in Malaya. In most cases the refuse is either placed in heaps or is dumped at sea. Control of the dumping of waste is, however, exercised by Public Health Authorities.

Marketing.

Most of the canned pineapples are marketed through the European exporting firms in Singapore. Malaya is the second largest producer of canned pineapples, Hawaii taking the premier position. Malaya has captured a market for a cheap product. This was rendered possible by cheap cost of production and by low costs in the field and factory. For these reasons, it is possible for Malaya to market a product which, if not perfect as far as grade is concerned, is a canned fruit of good quality and flavour and the cheapest canned fruit in the market. For these reasons it has become the poor man's dish and has found a ready market in the United Kingdom. Improvements in grading have more recently resulted in an extended market in other countries.

The distribution of exports from Malaya in 1933 was as follows:—United Kingdom 45,806 tons, valued at $4,746,949, Canada 6,241 tons, valued at $665,935, the continent of Europe 4,032 tons, valued at $380,674, other countries 3,502 tons valued at $491,898. Thus, the total exports were 59,581 tons, valued at $6,285,456, of which the United Kingdom took 77 per cent. Over 80 per cent. of the canned pineapples consumed in the United Kingdom is the product of Malaya.

The export value of pineapples has varied considerably in recent years. Between 1904 and 1918 the average was $4.73 per case; in 1919 it averaged $12.84, and in 1920, $16.30; thereafter the export value dropped steadily.

Actual market prices per case in Singapore in the past two years for the recognised grades were as follows :—

	Cubes	Sliced (flat tins)	Sliced (tall tins)
	$	$	$
1932	3.34	3.27	3.48
1933	3.11	3.00	3.19

Improvement of the Industry.

Acting on the recommendation of a Singapore Conference which reported to the Governments concerned early in the year 1931, efforts are being made to improve the industry; in the field, by investigating the cultivation of the crop, and improving the varieties grown for canning purposes; in the factory, by closer control of the factory conditions, and by the introduction of a grading scheme. Legislation now provides for the registration of all factories, the marking of cans to provide a means of identifying the factory from which they originated and the enforcement of hygienic conditions in factories. It is hoped that, in the near future, agreement in the trade will be reached for the introduction of a scheme of grading and inspection.

The Malayan canned pineapple has gained for itself an enviable reputation on the world's market as a cheap and good canned fruit at a low price. Provided that supplies can be maintained and that the improvements made in quality do not result in material increase in cost of production, the market for the Malayan product should be considerably increased in the next few years.

BANANAS.

Bananas are cultivated generally throughout Malaya, almost every small homestead having a few plants to supply fruit for home consumption. Being an article of general diet amongst Asiatics, a large number of varieties have become evolved, many of which are of a coarse nature, and are only eaten cooked. Amongst the better known cooking varieties are Pisang abu, a banana covered with a waxy "bloom"; Awak betul with a yellow, spotted skin; Awak legor, a tall variety with a yellow-skinned blotchy fruit which contains numerous seeds; Nangka, a variety producing a large fruit with a distinctive smell; Talon, a large fruit with yellow skin, flesh cream, soft and sweet and Tandok with a giant-sized fruit, exceeding a foot in length.

The dessert varieties are deserving of closer description by reason of the greater demand which exists for such varieties and the large area devoted to their production.

The chief commercial varieties cultivated in Malaya are Pisang Embun, P. Mas and P. Rastali.

Mas.

Rastali.

PRINCIPAL VARIETIES OF MALAYAN BANANAS.

EMBON.

RAJAH.

Pisang Embun, known also as P. Medji and P. Bunga, is considered to be identical with the Gros Michel or Jamaica banana. The plant is about 15 feet high, having pseudo-stems usually mottled with black markings; hands 8 to 9, fingers 15 to 17 per hand; fruit 6½ to 8 inches long, 1½ inches wide. The hands are evenly spaced and the fingers are large, well-filled, curved and of uniform thickness.

This is the best banana so far established and is excellent for dessert.

Pisang Mas.—The plant is of dwarf habit with pseudo-stems and petioles yellowish-green in colour; fruit 3 inches long 1¼ to 1½ inches broad. The skin is thin, often adhering to the flesh, which is a rich golden yellow, soft and sweet and somewhat "greasy". It is cultivated very extensively in some areas by Chinese and always commands a higher price than other varieties. The unsatisfactory features of this variety are that the fruit is very liable to bruising and is of a bad shape for transport.

Pisang Rastali.—The plant attains a height of 10 to 12 feet. The stems are dark green with chocolate markings. Bunch is 3½ feet long with 8 to 9 hands; fingers about 12 per hand; fruit 4 to 5 inches long, 1½ inches broad; skin yellow, rapidly becoming brown as it matures. The flesh is light yellow with a pleasant sub-acid flavour, which improves after keeping for several days. Although a popular variety, the skin is too thin and darkens too rapidly for it to be transported any distance.

Other well-known varieties of dessert bananas are Berangan, which is also made into flour when immature; Boyan with a white flesh, which adheres to the skin; the fruit is apt to fall from the bunch when ripe. Brok bakul, a plump fruit, a heavy yielder and of good flavour; Jari Buaya with a fruit prominently ridged; Kapas; Kelat, with a spotted fruit skin. Laing with a large fruit, skin reddish-yellow, flesh white, stiff and of good flavour; and Lilin, a variety popular amongst Asiatics, but rarely seen in the markets. Pisang Masak Hijau closely resembles Embun. The fruit is yellowish green when ripe, flesh soft and pleasant flavour. Fruits fall away from the hand when ripe and differ in this respect from Embun.

Pisang Rajah is a rather coarse-fleshed variety, popular in Java but less popular in Malaya. Raja Udang, a good quality banana with a dark red-brown fruit skin, is unpopular owing to the belief that it causes skin disease. Pisang Sa-ribu, not suitable for dessert purposes, is a very small fruit, as many as 1,500 fruits being produced per bunch. Pisang Serendah is a distinct variety, being a form of *Musa Cavendishii,* the Chinese or Canary banana. The plant is of dwarf habit; hands 3 to 4 with 14 to 16 fingers per hand; fruit medium size, greenish-yellowish when mature; flesh soft and of excellent flavour. Pisang Susu is a plant about 9 feet high, producing bunches 2½ feet long with 7 hands, fingers 10 per hand. Fruit is 5 inches long and 1¼ to 1½ inches broad, yellow in colour. The flesh is light yellow.

Cultivation.

The banana flourishes best on heavy soils fairly rich in organic matter, and in moist situations, provided that the soil is well-drained. The plant is liable to be damaged by heavy winds and should not be planted in exposed situations.

The cultural requirements of this crop are simple, provided that the soil is sufficiently fertile, of good depth and well drained. Propagation is effected by off-shoots or suckers, which are planted at distances of from 10 to 15 feet apart according to the habit of the variety. Large holes are opened and partly filled with a quantity of well-rotted cattle manure. The first bunch of fruits is usually produced at about one year from planting. After removing the fruit, the stem is cut down to allow the young suckers to expand. At this stage the clumps are mounded up with a mixture of trash and manure. The subsidiary stems produce fruit when from 12 to 16 months old and the plants continue to be productive for about five years. Under average conditions a yield of two bunches per year may be obtained from each clump.

Pests and Diseases.

The banana areas of Malaya are comparatively free from any very serious form of disease at the present time. Panama disease, caused by the fungus *Fusarium Cubense* exists only in an endemic state in Malaya. The varieties which have proved most susceptible to Panama disease are Embun, Rastali, and to a less extent Talon. The first named is the most important commercial variety. All of these varieties shew varying degrees of susceptibility under different physiological conditions. Moisture is the most important factor with regard to the incidence of this disease, the worst outbreaks occurring during the rainy season, and during the drier weather there is much less evidence of disease symptoms.

The soil organism causing Panama disease affects the vascular tissue only and internal symptoms of disease are first apparent in the roots or cut end of the sucker and afterwards appear throughout the rhizome and eventually in the above-ground parts. A cross section taken near the base of the pseudo-stem of a diseased plant shews the cut surface with rows of yellow, orange, red or red-brown spots which mark the position of the diseased vascular bundles. The distribution of the diseased fibro-vascular bundles is usually more concentrated towards the central portion of a diseased plant and the occurrence of a central rot associated with the massed bundles is of value in distinguishing Panama disease from diseases in which the rot extends from the periphery. There may, however, even in Panama disease be no development beyond a suffused yellowing and softening of the upper part of the bulb.

Bacterial vascular diseases of the banana exist whose internal and external symptoms are very similar to the Panama disease. These bacterial diseases are Blood disease, caused by *Pseudomonas celebensis* and the Javanese Vascular

disease caused by *Pseudomonas musae*. These diseases are met with fairly commonly in the Netherlands Indies but have not yet been found in Malaya. The external symptoms peculiar to Blood disease are:—(1) the yellow stripe effect on the leaves; (2) the particular discoloration occurring on the fruits. In the case of the Javanese Vascular disease, the typical symptom is the diminutive size of the heart of the crown.

Periodical outbreaks of the insect pest known as the leaf-roller (*Erionata thrax* L.) occur in most banana areas and often with quite serious results. The defoliation effect is usually sufficiently severe to cause the production of inferior fruit bunches. These outbreaks are largely influenced by the prevailing weather conditions. Dry periods appear to be the most favourable for the spread of this pest. All of the cultivated varieties appear to be equally susceptible to attacks by this insect. The two wild varieties, *Musa violescens* and *Musa malaccensis*, are not affected.

The banana weevil borer (*Cosmopolites sordidus*) does the greatest amount of damage in areas where there are poor soil conditions. In connexion with Panama disease, it has been suggested that the weevil-borer may be an important accessory factor as regards acting as a wounding agency. Experiments in this country have shewn that when Panama disease exists in a particularly endemic and virulent form, the weevil-borer seldom acts as an accessory factor in the spread of this disease. Inoculation experiments also shew that the weevil-borer enters into the rhizome of a sucker after Panama disease has established itself.

Products.

The entire Malayan banana crop is consumed locally.

Fairly extensive areas under the crop exist in Johore from which centre Singapore is largely supplied. Areas in Negri Sembilan supply the large towns of Kuala Lumpur and Seremban.

Banana flour has been prepared in Malaya for export. The quantities exported have been negligible. For the preparation of banana flour, the fruit is peeled, sliced thinly and sun-dried. The dried slices are crushed in a corn-mill or pounded in a mortar and sifted through fine muslin. As an alternative, artificial drying, preferably in vacuum dryers, is effected and results in a better-coloured product. The latter method, however, is not used in Malaya.

The Chinese use the old banana stems as a food for pigs. Although they are succulent and refreshing, their feeding value is low on account of the very small proportion of dry matter.

The preparation of fibre from the banana plant has been investigated. Although the cultivated banana yields a relatively small quantity of fibre, yet in quality it resembles the medium grades of "partially cleaned" Manila hemp.

Prices.

The wholesale price of bananas varies in different seasons, from about 50 cents to $1.50 per picul.

MISCELLANEOUS FRUITS.

There remains the large number of kinds of fruits scattered throughout the country, grown generally in mixed gardens, but to some extent, especially in the older Settlements of Malacca and Penang, in definite orchards of one or two kinds of fruits.

It is impossible in this place to describe all the fruits found in Malaya; they vary from the well-known cultivated fruits down to wild fruits, found in the jungle, but which are sometimes planted near centres of rural population.

Propagation.

Fruit trees may be propagated either from seed or by vegetative reproduction. The chief objection to propagation from seed is that frequently seedlings do not reproduce the desirable qualities of the parent tree; in other words, they do not breed true. Furthermore, the length of time to produce fruit is usually longer in the case of propagation from seed than it is from vegetatively-produced trees.

In raising plants from seed, the seed is usually sown in a nursery bed or in pots, bamboo baskets or boxes. In Malaya, the method of sowing in bamboo pots has gained some popularity and has much to recommend it. For this purpose, sections of bamboo stem are cut into suitable lengths, with a node forming the bottom, having a hole made for drainage. The bamboo is than filled with suitable earth, and the seed planted. There is no necessity to disturb the seedling until transplanting into the field. Should the seedlings be allowed to remain in the joints for more than a year the roots become twisted and unsatisfactory growth is obtained after transplanting.

Vegetative propagation may be effected by one of several methods. The choice of the particular method will depend upon the kind of fruit tree to which it is to be applied.

Root cuttings.—The roots of certain fruit trees such as the guava, citrus, breadfruit and wood-apple form adventitious buds, from which growing shoots with roots attached may be obtained.

Stem cuttings.—Several Malayan fruits may be successfully propagated from hardwood cuttings. The three species of Passiflora are readily raised from cuttings of hardened wood, a foot or so long, placed in sandy soil under shade. Other fruits that may be propagated by this method are most of the Eugenias and most citrus fruits. Several low-growing fruits may be propagated from cuttings. In general practice, however, only a few fruits are likely to be raised satisfactorily from cuttings.

In taking stem cuttings a clean cut is necessary. The basal end is cut close to the bud or node and all the lower leaves removed. The cutting is about a foot in length.

Cuttings are planted in sandy soil and the earth pressed well down around the stems. After roots have developed, top shade can be reduced gradually, until the young plant is sufficiently hardy to withstand ordinary climatic conditions.

Sometimes greater success may be attained by ringing the bark, or tying a piece of twine or wire around the stem before removing the cutting. This results in the formation of a swelling above the ring. The branch is then cut immediately below the ring and planted in the nursery bed.

Budding.—After much experiment, the modified Fockert Method has been adopted. In this method only a transverse cut is made in the stock, the bark being stripped down either in one or several pieces and three-quarters of the flap cut off. It has been found that the bark of the stock heals better by using this method and that a greater number of successes are obtained. Raffia grass is used as the tying material, while a rosette of leaves is usually fastened around the main stem above the bud to provide shelter from sun and rain. Preliminary success with budding has been attained with rambutan, durian, pomelo, limes and various other citrus fruits, avocado pear and guava.

Layering and marcottage.—Layering consists in rooting a branch or shoot by bending it down to the soil and partially interrupting the flow of sap from the parent tree by a cut or ligature. *Stool-layering* is the production of roots induced by drawing the surrounding soil round the base of the tree. These methods have only a restricted application in Malaya.

Marcottage is a modification of layering, but is especially adapted to many Malayan fruits, in particular the chiku, but also for raising limes, mangoes, rambutans and pulasans. A branch, about three feet long and three-quarters of an inch at its greatest diameter, is ringed with a sharp knife in two places one inch apart, and the bark from the ringed portion is removed. This portion is covered with coconut husk mixed with soil. The husk is tightly bound to the branch and kept moist. In favourable circumstances, roots will shew through the fibre in two to three months. After a further three months the branch is severed from the parent plant just below the portion operated on and planted without removal of the husk. New plants of chiku, produced in this way, frequently bear fruit in the first year, but no fruit should be allowed to set for the first two years.

Grafting.—It is probable that some of the many methods of grafting would be suitable for the propagation of fruit trees in Malaya. Information on this subject is, however, very scanty, and in the absence of definite information, no recommendation can be made. Generally, budding on seedling stocks is preferable to grafting, for under tropical conditions, difficulty is experienced in obtaining material as scions in a sufficiently dormant state.

Etiolation.—This is a system of layering, and suitable for the production of planting-stock on a large scale. The principle involved is the production of a number of shoots from the partially buried main stem and primary branches; the shoots under suitable conditions produce roots at their bases. The necessary conditions are obtained by mounding up the shoots with soil, which causes the lower portions of the stems to become etiolated or blanched. To ensure rapid root formation, the soil is then removed and a band of thin wire placed round the base of each shoot a short distance above its point of origin. The soil is then replaced and root formation occurs. Success by this method has been obtained with limes, lemons, mandarin oranges, jambu betai, chiku, rambutan, avocado pear, durian and guava.

Soils.

The best type of soil for fruit culture is usually found in the plains and valleys formed from alluvial deposits brought down from the mountains. The extensive tracts of land adjoining the large rivers of the Peninsula are ideal for the cultivation of fruit. Such soils, on account of their close and impermeable texture, require more cultivation than do the open sandy soils of the low undulating hills. Even with good drainage, unless some form of cultivation is given, the root growth is liable to be restricted and to form a close mat of surface roots. There are, however, several Malayan fruits which succeed on such land, of which the mangosteen may be cited as an example.

The low peaty lands of the coast are generally unsuited for fruit culture. Where there is a quantity of clay present, better results are possible.

Considerations, other than that of soil, generally determine the land in which small areas of fruit are grown. Fruit trees are preferably planted near the house, otherwise the fruit may be stolen. If planted near a jungle, the fruit will probably be taken by animals and birds. Many fruit trees are very ornamental in appearance and enhance the surroundings of the house if judiciously planted.

On flat land with a high water table, drainage is essential. The prevention of surface-soil erosion on hilly land must be effected by any of the recognised methods, such as terracing, pitting or the planting of cover crops.

In districts where damage is done to trees by high winds, some form of windbreak around the orchard is advisable. Windbreaks may be established by planting strong-growing trees at right angles to the direction of the prevailing winds.

Cultivation.

The large Malayan fruits, such as durians, are capable of looking after themselves, but the smaller kinds need cultivation and protection from domestic animals.

In the tropics, fruit trees are planted out when much younger than is the case in temperate climates. There being no dormant season, the trees must

be planted when in a growing condition and young trees are more easily handled and less liable to receive a check than older trees.

If the trees are to be removed from a nursery, the roots must not be disturbed more than is absolutely necessary. In planting, the trees must be planted at their previous level and the earth banked round the stems at least six inches to allow for settling, as trees cannot grow in pits.

If planted during dry weather, watering is necessary until the plants become established; but it is better to plant at the commencement of the rains, say in October or March.

Trees that are likely to be blown about by the wind require to be staked directly after planting. Some form of temporary shade is necessary until the plants are established, when it may be gradually discarded.

The land may either be clean-weeded or planted with one of the recognised cover crops. When cover crops are employed, strip or circle weeding is necessary to keep the cover crop away from the base of the fruit tree. Unless this precaution is taken, growth is considerably retarded.

The amount of cultivation will depend on local circumstances. Cultivation during dry weather is generally beneficial and mulching is recommended.

Little is known about stem and root pruning of fruit trees in Malaya. Any work in these directions, therefore, requires to be carried out with caution in the first place, until the effect is evident.

Knowledge regarding the manuring of fruit trees in Malaya is still very imperfect. It is found, however, that fruit trees respond to dressings of farmyard manure, supplemented with basic slag. A complete mixture of artificial fertilizers consisting of calcium cyanamide, basic slag and sulphate of potash in the ratio by weight of 1 : 3 : 1 has been used with beneficial results as a general dressing at the rate of 4 lbs. per tree on avocado pear and other fruit trees. This dressing may be doubled if the trees are large.

Digging a trench round the trees at the limit of branch spread and incorporating cattle manure with such material as leaves, weeds, groundnut cake and with or without the addition of artificial fertilizers gives beneficial results. This method is similar to that successfully used by Chinese fruit growers in Malaya, but in addition to farmyard manure, or as a substitute for it, fish refuse, prawn dust and groundnut cake are often employed.

For the raising of fruit stock it has been found necessary to "bastard trench"* the land and to incorporate in it plenty of cattle manure. Basic slag is afterwards spread on the surface at the rate of 2 cwts. per acre. After the seedlings have become established, a complete mixture consisting of calcium cyanamide, basic slag and sulphate of potash, in the ratio of 2 : 4 : 1 at the rate of 2 cwts. per acre has been sprinkled between the plants and worked into the soil, followed three months later by a dressing of sulphate of ammonia at the rate of 2 cwts. per acre. This method of manuring has produced good results with rambutan and other stocks.

---

*BASTARD TRENCHING.—The land is marked out and the soil at one end removed to a depth of 9 inches for a width of 2 feet. The soil from this trench is placed at the other end of the bed for the purpose of filling the last trench. Farmyard manure and other organic matter are laid in the open trench and the soil is then moved forward two feet through the whole of the bed.

Principal Fruits in Malaya.

There are a large number of fruits suitable for cultivation in Malaya. One writer enumerates 39 principal fruits for cultivation, 47 fruits of less importance, 44 indigenous fruits, infrequently cultivated, but collected and eaten by Asiatics, and 5 fruits suitable only for growing on the hills in Malaya. It is beyond the scope of this Journal to give a complete account of all the fruits of Malaya; a selection of the more important and well known has been made and brief notes given concerning each of them.

Achras sapota. Sapodilla. CHIKU (M).

This well-known fruit is cultivated throughout the Peninsula. It is a large symmetrical shrub, or small tree, 10 to 20 feet high. A good chiku fruit should be about 3 inches long and 2 inches in diameter. The skin is rough, and russet brown in colour, thin, and enclosing a quantity of sweet brown pulp. The fruit is produced almost throughout the year, but is usually most plentiful about the middle of the year. The fruits are picked in an unripe condition and ripened in bran or straw in a dry place.

The chiku makes slow growth, but quite young plants will bear fruit. The most common method of propagation is marcottage. Trees grown in this manner frequently reach the fruiting stage in a year or so from planting. The distance of planting should be 20 feet apart.

Anacardium occidentale. CASHEW-NUT. Gajus, Jangus or Jambu Parang (M.). A low-spreading tree well-established along the sea coast in Malaya. The curious fruit is composed of a swollen stalk or peduncle, at the extremity of which a kidney-shaped nut, about 1½ inches long, is borne. The peduncle is sweet and juicy and has a pleasant acid flavour. The nut may be eaten either raw or roasted; it is important, however, to remove the slate-covered skin which is extremely acid and highly irritant.

The cashew-nut grows in a sandy soil and near the sea. Trees may be raised from nuts sown in a sandy soil in a shady situation. The plants are later transplanted and spaced 30 feet apart. As there is great variation in the quality of the fruit, scions from sperior material should be budded on to seedling stocks about six months old. Budding may be successfully undertaken with this fruit.

Anona muricata. SOURSOP. Durian belanda (M). A quick-growing tree, reaching a height of about 25 feet, much cultivated throughout Malaya. It produces large kidney-shaped fruits, each weighing about two to three pounds. The skin of the fruit is rough and covered with a number of short, soft spines. The pulp is white, rather fibrous, juicy and somewhat acid. It contains a number of large black seeds and is largely employed for flavouring ices and in the preparation of cooling drinks.

Propagation is usually effected by seeds, but it may also be raised from cuttings. It grows well when budded on to stocks of other species of the genus *Anona.*

Soursop Fruits.

Durian Fruits.

This tree, as well as the custard apple and bullock's heart, is very liable to the attacks of the larvae of the atlas moth (*Attacus atlas*). These caterpillars are best removed by hand-picking. The soursop will grow in most soils, but does best in land that is rather damp. Trees should be planted 20 feet apart.

Anona squamosa. Custard Apple. Sugar apple. Buah Seri kaya (M). A small tree, 10 to 20 feet high, which appears to thrive well locally in a fairly dry situation on open land. The fruit is about 3 inches in diameter, pale green, and covered with a number of short warty scales. As the fruit ripens, it turns a blackish colour and becomes soft. When ripe, the scales break away separately, exposing the creamy pulp inside. The pulp is very sweet and has a pleasant flavour. The fruit is produced throughout the year but is most abundant in June. Seeds germinate readily. Plants should be spaced 15 feet apart.

Anona reticulata. Bullock's Heart. Nona kapri (M). A small tree, 15 to 25 feet high, distributed throughout Malaya. The fruit is about 3 to 4 inches in diameter, smooth with slight depressions and, when fully ripe, reddish in colour. The pulp is cream-like and yellow near the skin, but almost white in the middle. Several large brown seeds are distributed amongst the pulp. It is raised from seed and planted 20 feet apart in the field.

Artocarpus integrifolia. Jack Fruit. Nangka (M). This large fruit tree is widely grown throughout Malaya. The Malays recognise two varieties; Nangka beluong with a firm flesh and considered the better kind, and Nangka bubor, the flesh of which is soft. The fruit, which attains a great size, is borne on the trunk and older branches. It is oblong in shape, green in colour, and the rind is formed by a number of conical protuberances. As the fruit matures, it is enclosed in matting to protect it from squirrels, fruit-bats and insects. When ripe the fruit has a strong smell and taste. The large oily seeds are encased in a soft cream-coloured pulp, which is eaten raw or cooked in various ways. The seeds are edible and are roasted and eaten in curries.

The tree is propagated from seeds and succeeds best in a deep loamy soil. Budding on one year old seedling stocks produces strong trees of uniform growth. Under good conditions a tree will reach a height of 25 feet in the third year from germination and commence bearing fruit. The trees are planted 30 feet apart.

Averrhoa bilimbi. Blimbing. Belimbing buloh (M). A small tree, branching low down. The fruit, produced on the old wood of the stem and branches, is greenish-yellow in colour, about 3 inches long, oblong, slightly furrowed and resembling a small cucumber. It is used in curries or made into jam. The blimbing is widely distributed throughout Malaya and thrives well in most soils. A crop of fruit is usually produced twice a year. The tree is propagated from seed, or by layering. The seeds are very minute and are sown in pots or boxes under shade; later they are transplanted at distances of 20 feet apart.

Averrhoa carambola. Belimbing batu (M). A small tree 15 to 20 feet in height. The fruit is produced in axillary panicles, sometimes on the old wood. The yellow fruit is about three inches long, fragrant, acutely four or five-angled and produced in great profusion. There appears to be great variation in the quality of the fruit a fact which it is necessary to take into consideration when propagating the tree. Budding on to one year old seedling stocks is done without difficulty.

Baccaurea motleyana. RAMBAI (M). An indigenous tree of the Malayan region, commonly cultivated throughout the Peninsula. It is medium-sized, of symmetrical shape, for which reason as an ornamental tree, for planting in a lawn, it is most suitable as it has a bold and pleasing outline. The fruits are borne in long hanging strings often two feet in length. The individual fruits, which are produced in great quantity, are about 1¼ inches in diameter, buff-coloured, round, with a smooth and thin rind. Inside the rind are three or less, green seeds enclosed in a fleshy edible arillus. There is considerable variation in the quality of the fruit; some are acid, but others are sweet and very palatable. The fruit is eaten raw, but it also may be stewed. It is readily raised from seed and grows well in most soils, but shews a preference for the alluvial soils found adjoining many of the large rivers. Plants are spaced in the field 35 feet apart.

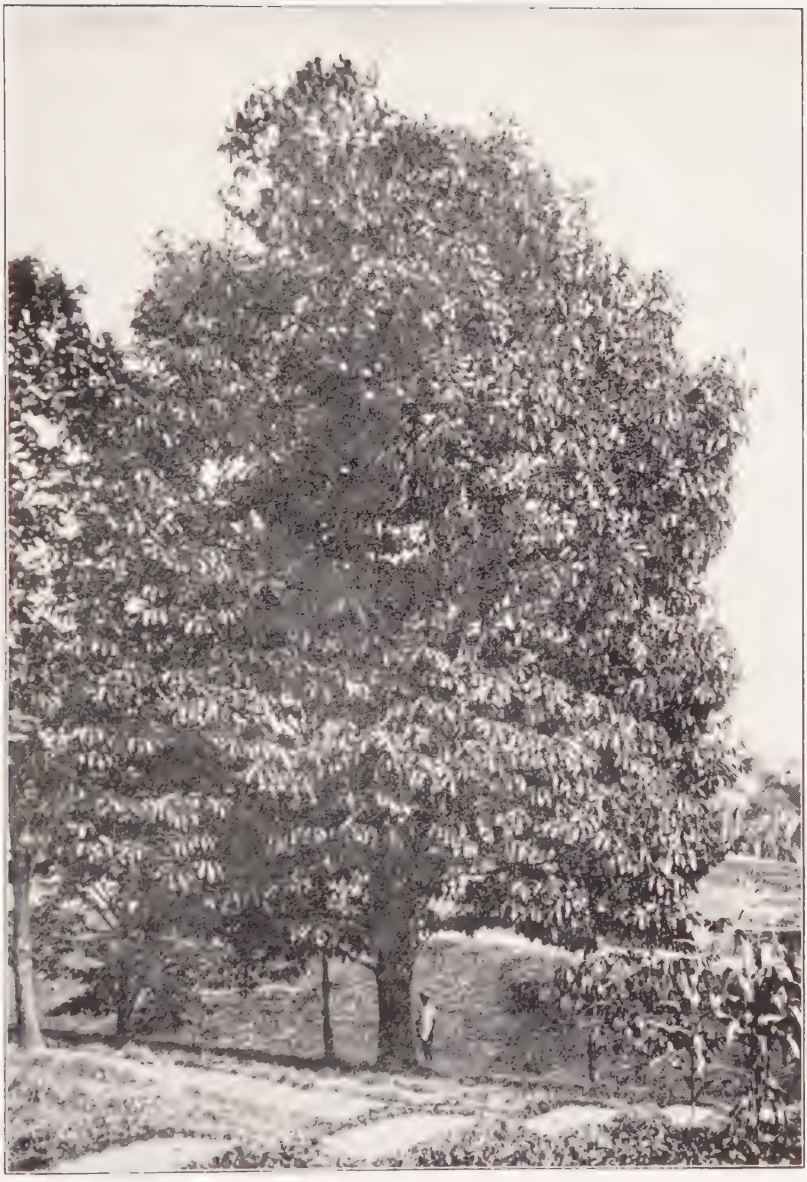
Bertholletia excelsa. BRAZIL NUT. A large tropical tree, often attaining a height of over 100 feet. Introduced to Singapore in 1884 and propagated on a larger scale by the Department of Agriculture at Kuala Lumpur since 1913.

The nuts are contained in a very hard shell, about 14 nuts being in each. The seeds are germinated in a moist warm sand-bed and then removed to a nursery or better still, placed in bamboo joints. When about one foot high they may be planted out, 35 to 40 feet apart.

Bouea macrophylla. KUNDANGAN (M.). A glabrous tree found wild in many parts of the Peninsula. The fruit resembles a yellow plum. It is eaten raw, but is better stewed.

Bouea microphylla. RUMENIYA. Ramnia (M). A large tree, distributed throughout Malaya. The fruit is acid when eaten raw, but excellent for making into preserves. It is almost round in shape and about 1½ inches in diameter. The skin becomes very sticky as the fruit ripens, when it resembles a small yellow plum. The pulp surrounds a single seed, flattened, one inch long, covered with stringy fibre. The fruit usually ripens during July. Plants are spaced 30 feet apart.

Carica papaya. PAPAYA. Betik (M). The papaya grows well in Malaya. It is of rapid growth and in suitable soil will produce ripe fruit within one year of the sowing of the seed. The trunk is usually branchless and attains a height of 20 feet, surrounded by a crown of palmate leaves. The large green fruits are produced at the base of the leaves. The papaya fruits throughout the year. The most striking variety has a very large fruit, often over a foot in length. The small fruiting varieties usually produce fruit of superior flavour. The flesh



Brazil Nut Tree.

Passion Fruit.

Guava Fruits.

should be of full orange colour and fairly firm. The leaves are often used to make meat tender. This is done by wrapping the leaves round the fresh meat for several hours before use.

Papain is obtained from the milky juice which exudes from unripe fruit on scratching the surface with a sharp instrument. The juice is dried, preferably *in vacuo* and the dried product sold as a digestive.

The papaya responds to good cultivation. The young plants are spaced about 15 feet apart. The best fruits are produced during the first three years and though the trees will usually continue to produce fruit for another three years, such fruits are usually very inferior.

CITRUS.

This genus includes the lime, orange, lemon and pomelo. These fruits are often very disappointing in Malaya, due in part to neglect, but also in part to unfavourable climatic conditions. The trees and, in some cases, the fruits—notably of the pomelo—are very liable to the attacks of insect pests. The lime (*citrus acida*), is the most satisfactory fruit of the group and with good cultivation, will produce heavy crops of fruit.

Citrus fruits may be propagated from seeds, by cuttings, marcottage and the various methods of budding and grafting. Vegetative propagation is to be recommended. Judging from experience elsewhere in the tropics, the choice of suitable stocks is an important matter in citrus culture. The Japanese citron (*Citrus nobilis* hybrid), Saramacca citron (*C. Amantium*), rough lemon (*C. Limonia*), and sun orange (*C. Amantium*), are the stocks most commonly used.

Citrus acida. LIME. Limau asam (M.). There are a number of varieties, the best and commonest being "limau nipis" which is sold in fair quantities in local markets. "Limau kedangan" has a small fruit, and tastes like an orange. "Limau kesturi" is a small tree with narrow leaves and small, round and very acid fruits, used for pickling. "Limau susu" is a large fruit chiefly used in washing clothes. "Limau kerbau", a large oblong fruit, yellow when ripe.

Citrus Aurantixum. ORANGE. Limau manis (M.). Require a good soil. The damp climate of Malaya is probably unsuited to them. The fruits are green and do not turn yellow when ripe. In Malaya trees are generally raised by marcottage.

Insects are generally troublesome, especially caterpillars and scale insects. Mealy bugs often appear and must be destroyed with kerosene emulsion applied with a stiff brush. Red ants make their nests in the trees by drawing a number of leaves together. They are undesirable on account of the fact that they establish and tend colonies of scale insects, for the purpose of securing their "milk". The nests are destroyed by scorching them with fire, applied by means of a piece of sacking dipped in kerosene and tied to the end of a long pole.

Citrus maxima. POMELO. Limau Batawi or L. besar (M.). Numerous forms of this well-known fruit are known in Malaya, differing in the size and colour of the fruit. The pomelo grows well in many districts, especially where the soil is low-lying and of an alluvial nature. The mature tree attains a large size and in planting, a distance of 35 feet is allowed between the trees.

The pomelo is very susceptible to the attacks of the pomelo moth (*Nephopteryx sagittiferella*). The only effective method of preventing damage by this insect is to "bag" each growing fruit.

Citrus nobilis (MANDARIN ORANGE). This orange is readily grown, but poor varieties with watery fruit of poor flavour are continually met with in Malaya. It is the most promising dessert citrus for local cultivation. The mandarin orange in its various forms is easily distinguished owing to the skin peeling without difficulty and the sections readily parting. Large quantities of these oranges are imported from China during December and the early months of the year.

Durio Zibethinus. DURIAN. The durian is widely distributed throughout Malaya. On low alluvial soil the tree may attain a height of 100 feet, whereas on stiff clays and poor soils the tree remains stunted and frequently unproductive. The tree fruits about 8 years from planting. The main crop is produced in July and August, but usually a definite subsidiary crop is also obtainable at the close of the year.

There is considerable variation in the size and quality of the fruit, and some possess a stronger odour than others. The very large kind weighs from ten to fifteen pounds and is known as durian kepala gajah.

A good durian should have little of the strong odour for which it is famous and should have plenty of pulp on the seeds.

The durian is readily raised from seed if sown fresh. The vitality of the seed is short and poor germination is likely if the seeds are kept for more than a week. The tree is very impatient of disturbance of its roots. A mature tree has a large spread so that the planting distance is 50 feet apart.

Garcinia mangostana. MANGOSTEEN. Buah manggis (M.). The mangosteen is one of the best and most sought after fruits in Malaya. The tree is variable in shape, but it is usually conical, about 15 feet high. Very tall trees require to be pruned back.

The mangosteen grows best on low-lying alluvial soil and though liking plenty of moisture round the roots, good drainage is necessary. Very good trees are often seen growing in low-lying situations under the shade of rubber trees. The surface soil beneath the trees is cultivated periodically and mulched. During the early stages of growth shading is necessary, which may be removed when the trees are well established. The plants are spaced 25 feet apart. The main crop is gathered during August and September, a smaller crop being produced about November.

Mandarin Orange.

Mangosteen Fruits.

A good mangosteen should be two and a half inches in diameter and the edible pulp one and a half inches through. This pulp is divided into a number of segments, varying from five to seven. These segments may contain seed, but a large proportion of them are infertile.

Lansium domesticum. LANGSAT. A medium-sized tree widely distributed throughout Malaya. The small yellow flowers are produced in abundance on the old wood and branches in small racemes. The fruit is round or oval, 1 inch in diameter and 1½ inches long, with a thin buff-coloured rind, which when broken exudes a small quantity of white latex. The sweet pulp surrounds two or three thin green seeds and is very palatable. The langsat is raised from seed and is of slow growth. It prefers a good low-lying soil.

Lansium domesticum var: *duku.* DUKU. The duku is said to be a cultivated and improved form of the langsat. The rind is thicker than that of the langsat, splits into five pieces when ripe and does not contain latex. The fruit is from 1½ to 2 inches in diameter. The pulp is sweeter and the fruit generally superior to the langsat. The fruit usually ripens during the latter part of August and September.

Mangifera indica. MANGO. Mempelam (M.). In Malaya, the mango fruit produced is usually of very inferior quality. It thrives in a deep and well-drained loamy soil, and requires a hot and rather dry climate.

Nephelium lappaceum. RAMBUTAN. This well-known fruit, probably indigenous to Malaya, is a tree of medium size. The main crop is generally ripe in August and September and is followed by a secondary crop towards the end of the year. The colour of the fruit varies from yellow to crimson. There are also variations in flavour and quality of the flesh on the stones. In the best varieties the flesh comes away easily from the stone.

The rambutan will grow in most soils, but responds to good cultivation. The Malays usualy raise young plants by marcottage, but well-formed trees may be raised from budded seedlings, and undoubtedly, this form of reproduction will be commonly undertaken when it is better known. Plants are spaced 35 feet apart.

Nephelium mutabile. PULASAN. The pulasan is a very similar tree to the rambutan, though usually smaller. The fruit ripens several weeks earlier than the rambutan and is larger and covered with stunted processes instead of the long hair-like spines of the latter. The flesh is thick and firm and enclosed in a thick rind. The fruit is a deep purplish-brown and superior in flavour to the rambutan.

The pulasan requires the same cultivation as the rambutan. It may be propagated from seed, though it is possible to raise plants by marcottage. Budding is easy and successful, as for the rambutan.

Persea gratissima. AVOCADO PEAR or Alligator pear. This fruit tree grows well in Malaya, although being a comparatively recent importation, it is not very well-known.

Under cultivation the tree reaches a height of 25 to 30 feet. The fruit is pear-shaped, covered with a green skin, which turns yellow or purple as the fruits mature. The flesh is firm, greenish-yellow in colour and encloses a single large round seed. A large fruit may be over 4 inches long and weigh almost a pound. The flesh is scooped out with a spoon and eaten as a salad, with the addition of pepper, salt and vinegar. The fruit is picked when nearly ripe and kept in a cool place until soft, when it is ready for consumption.

The tree may be propagated from seed or by budding. Vegetative reproduction is recommended. The plant is easily cultivated and in good soil will make very rapid growth. It appears to favour a soil of good depth, moist but well-drained. The plants are spaced 35 feet apart. The fruit is liable to attack by a large borer.

Psidium guajava. GUAVA. Jambu biji (M.). The guava is a spreading hardwood shrub, or small tree, and is common in Asiatic homesteads in Malaya. There are two varieties in Malaya—one with white flesh, the other pink. The tree reproduces itself freely from seed. It is of rapid growth and produces fruit within a few years from seed. Plants are spaced 25 feet apart.

Less Important Fruits.

There are a large number of other fruits, either cultivated or occurring naturally in Malaya. The following notes must suffice to introduce them to the reader.

Eugenia aquea. Jambu ayer mawar (M). A small tree producing a pink-coloured soft watery fruit.

Eugenia malaccensis. Malay apple. Jambu bol (M.). A large tree producing a pear-shaped, rather flavourless fruit.

Eugenia uniflora. Pitangi. Surinam cherry. Chermai belanda (M.). A shrubby tree producing red, waxy, cherry-like fruits.

Hibiscus Sabdariffa. Roselle. Jamaica or Red Sorrel. An annual shrub, the fleshy calyx and bracts of which are edible.

Passiflora laurifolia. Jamaica honeysuckle. Water lemon. Buah susu (M.). A perennial climber, bearing orange-yellow fruits.

Artocarpus incisa. Bread-fruit. Sukum (M.). A large tree bearing a fruit which in Malaya is of rather poor quality.

Artocarpus Polyphema. Chempedak (M.). A Malayan tree bearing fruit similar to jack fruit, though smaller in size.

Garcinia atroviridis. Assam gelugor (M.). A handsome tree bearing an orange-yellow fruit, about 3½ inches long and 2½ inches in diameter, flattened at both ends and regularly grooved from top to bottom. Malays sun-dry the sliced fruit, which is afterwards eaten with curry.

Nephelium malaiense. Mata kuching (M.). A medium-sized tree bearing a fruit very popular with Asiatics.

In addition to the above there are a large number of fruits eaten but not as a rule cultivated by Asiatics.

Rambutan Fruits.

Carambola Fruits.

Pests and Diseases.

There are numerous pests and diseases that cause damage to fruit trees in Malaya. Under the headings of the respective fruits occasional reference has been made to certain pests and diseases that are of common occurrence.

Fruit trees are very liable to damage by parasitic and epiphytic plants. The former are the more harmful as they obtain part of their nourishment from the tree upon which they grow, whereas epiphytes merely grow on the surface of the bark and do not penetrate. The most injurious of all the parasites are the several species of *Loranthus,* which resemble in habit and are closely related to the European mistletoe. These shrubs are widely distributed throughout Malaya, but are most common in cultivated areas. The species most commonly met with is *Loranthus ferrugineus,* a straggling shrub with entire, opposite leaves about 2 inches long, the undersides being covered with a rusty-brown tomentum. All species of *Loranthus* are highly injurious to the trees they grow upon as their roots penetrate the tissues of the host plant and form channels through which certain food materials are extracted.

Parasitical plants seldom kill their host plant outright, but do considerable local damage to the branches on which they grow. The affected branch gradually dies, meanwhile the parasite obtains a hold upon other parts of the tree by means of its creeping stems with adhesive discs.

Branches that are badly affected by parasites are removed by cutting the bough off below the part on which the parasite has gained a hold. A saw is used for this operation and all exposed surfaces must be given a coating of tar or other disinfectant. If taken when young, the parasite may easily be removed by hand. The remains of its roots are shaved off with a knife and a coating of disinfectant applied to prevent the access of fungi and insects.

The majority of epiphytes do little damage. The most injurious is the little creeping fern, *Drymoglossum piloselloides,* easily recognised by its round flat vegetative fronds and erect narrow spore-bearing ones, and *Dischidia nummularia,* a creeping plant having round, fleshy leaves produced close together and lying flat on the bark. Plants of this description should be scraped off before they spread over the main branches of the tree.

Red ants (kerengga), *Oecophylla smaragdina,* are frequently a source of trouble in fruit trees. These insects make their nests amongst the branches by drawing together a number of leaves. The nests have to be burnt out.

Trade.

There is a very considerable import of fruits into Malaya. In 1933, over 8,000 tons of fresh fruits and about 4,000 tons of dried and preserved fruits were imported. Most of these imports are of varieties which are unsuited for cultivation in Malaya. At the same time, it is possible that if the locally produced fruits were of better quality and if supplies were more regular, the demand for imported fruits would be less.

BIBLIOGRAPHY.

Pineapples.

Use has been made of the following articles published in the *Malayan Agricultural Journal.*

Pineapple Industry in Malaya. D. H. Grist. Vol. XVIII No. 4, 1930.
Pineapple Cultivation. D. H. Grist. Vol. XVIII No. 5, 1930.
Pineapple Canning. D. H. Grist. Vol. XVIII No. 6, 1930.

By-Products of the Pineapple Canning Industry. V. R. Greenstreet and Gunn Lay Teik, Vol. XVI No. 1, 1928.

Report of the Pineapple Conference held at Singapore 1931. (An abstract of the Report was published in the *Malayan Agricultural Journal* under the title "The Pineapple Canning Industry in Malaya" Vol. XIX No. 9, 1931).

The Malayan Pineapple-Canning Industry. G. D. P. Olds.

Plant Propagation. E. A. Walters. *Tropical Agriculture.* Vol. IX No. 2, 1932.

Bananas.

Banana Flour and other Flours etc. B. J. Eaton. *Malayan Agricultural Journal* Vol. VI No. 10, 1918.

Jamaican or Gros Michel and the Pisang Embun of Malaya. *Malayan Agricultural Journal* Vol. XIII No. 12, 1925.

Banana Growing in Malaya and the Presence of Diseases. F. S. Ward. *Malayan Agricultural Journal* Vol. XVIII No. 2, 1930.

Guide to the Government Experimental Plantation, Serdang. 1931.

Handbook of Malayan Agriculture 1924.

Miscellaneous Fruits.

Fruit Culture in Malaya. J. N. Milsum. Bulletin No. 29 (Old Series) Department of Agriculture, S.S. and F.M.S. 1919.

Catalogue of Fruits Suitable for Cultivation in the Malay Peninsula. J. N. Milsum. Agricultural Bulletin of the F.M.S. Vol. VI No. 9, 1918.

The Brazil Nut in Malaya. J. Lambourne. Special Bulletin, General Series No. 2. Department of Agriculture, S.S. and F.M.S. 1930.

Propagation of Tea from Etiolated Shoots. J. N. Milsum. *Malayan Agricultural Journal* Vol. XXI No. 7, 1933.

The Propagation of Fruit-Trees by the Etiolation Method. J. Lambourne. *Malayan Agricultural Journal,* Vol. XXII No. 2. 1934.

Extracts

THE CANNED PINEAPPLE MARKET.*

The United Kingdom Market.

In common with canned fruits as a whole, considerable growth has taken place in the United Kingdom imports of canned pineapple since the war, and in 1932 imports reached the record total of 966,000 cwts. with a declared value of nearly £1¼ million. In 1933, however, there was a decline of 18 per cent. to a total of 793,000 cwts. valued at £880,000. Compared, however, with the average for the five years 1927—31 (692,000 cwts.), imports in 1933 showed an increase of 15 per cent., and were greater than the average for the five years 1922—26 (561,000 cwts.) by 41 per cent. It is interesting to note that in the year 1913 only 270,000 cwts. of canned pineapple were imported.

Although the volume of canned pineapple imported increased considerably during the years 1921—31, there was not much change in the relative position of this fruit in the United Kingdom canned fruit import trade. In 1931, canned pineapple comprised 26.2 per cent. of the total imports of canned fruit preserved in syrup as compared with averages of 28.8 per cent. and 27.3 per cent. for the periods 1921—25 and 1926—30 respectively. In 1932, in spite of increases in the quantities of other classes of fruit, the percentage of pineapple in the total rose to 30.2 per cent., but in 1933 the percentage receded to 26.3 per cent., or almost the same as in 1931.

There have been no significant alterations in the countries of supply in recent years, although the growing importance of Australia and the increasing imports from Japan, probably of Formosan origin, are worthy of note. Up to 1932, however, there was a tendency to change in the proportoins coming from different countries. Empire countries continued to take a large and growing share of the trade, and in 1932 accounted for over 94 per cent. of the total imports of which all but 2 per cent. came from British Malaya. In 1933 there was a setback from this very high percentage to 92 per cent., British Malaya alone supplying nearly 90 per cent. But while the proportion received from this source has attained a high figure, the percentage of imports from South Africa has recently declined to small proportions. A similar movement has been noticeable in the trend of supplies from Hawaii, practically the only foreign source of any consequence up to 1933, when Formosan fruit became of importance for the first time; between 1928 and 1933 the share of Hawaii actually declined from 15½ per cent. to less than 6 per cent.

For some years only negligible quantities of canned pineapple were received from Australia, but there was a revival in 1932, when some 10,500 cwts. were imported from that country, and the total was further increased to 15,900 cwts. in 1933. Small consignments have also been received from Fiji (1,200 cwts. in 1933 and 1,700 cwts. in 1932), while a new feature in 1932 was an importation from Mauritius amounting to 500 cwts., which increased to 1,300 cwts.

---

*The following extracts are reproduced from "Canned and Dried Fruit Supplies in 1933, prepared by the Intelligence Branch of the Imperial Economic Committee, July 1934" by permission of the Controller of His Majesty's Stationery Office.

in 1933. Imports from Japan (probably Formosan) were very small until 1933, when 8,900 cwts. were registered as against 1,800 cwts. in 1932 and only 80 cwts. in 1931. From Hayti 2,800 cwts. were imported as against only 40 cwts. in 1932. The industry of Fiji, Mauritius and Hayti is as yet only on a small scale, but in Formosa it is considerable and growing fairly rapidly.

Seasonal fluctuations of imports of Malayan canned pineapples are fairly well defined. In the first three or four months of the year shipments remain comparatively steady and arrive on a fairly substantial scale, reflecting the winter pack in November and December. May is normally a month of lower imports, but, following the main packing season, a substantial advance occurs in June and the peak of the imports generally occurs in this month or in July. Imports in August and September usually continue on a considerable but decreasing scale until the month of minimum imports is reached in November.

The small imports from South Africa are, as a rule, fairly evenly distributed over the year. The seasonal change is not very well defined, but, as would be expected, the peak of the shipments generally occurs in the spring. Imports from Australia in 1933 were fairly evenly spread throughout the year, although there was a falling-off between September and November. Imports of Hawaiian pineapple differed considerably in 1933 from the normal trend. Usually the imports reach a peak, though not always their maximum, in February. In the following months a sharp decline is recorded until the lowest point is reached between June and August. The pronounced upward trend normally starts in September, or in October, and is followed by a decline towards the end of the year.

The Hawaiian Canned Pineapple.

It will be recalled that a scheme of pack restriction was introduced in the Hawaiian Islands to deal with the 1932 output, and the Pineapple Producers' Co-operative Association, Ltd., was formed to control the whole of the canned pineapple produced in the territory. The agreement originally provided for the regulation of the 1932 and 1933 packs only, but it was subsequently extended to cover packing operations for a period of ten years.

Although the 1932 output was restricted to 5 million cases (the actual pack was 5,064,000 cases), the anticipated recovery in consumption failed to materialise, and stocks at the beginning of the 1933 packing season are estimated to have amounted to the large total of about 4.2 million cases. In face of this surplus a pack of 5 million cases was again fixed for the pack year beginning June, 1933; later, however, as the result of improved movement it was considered justifiable to raise the limit to 8 million cases of all sizes, exclusive of juice, a figure which will probably not be exceeded by any great amount. Complete figures are not yet available for the period June to May of the current season, to which period the 8 million limit relates; but in the calendar year 1933—which covers the bulk of the 1933—34 pack, but which also includes some part

of the previous year's output—the quantity produced totalled 7,816,000 cases, a substantial increase on the previous similar period, though still far below the normal for many years before 1932.

Pack and carry-over for the 1933—34 season thus amounted to nearly 12¼ million cases, as compared with about 10½ million cases in the previous similar period. The carry-over on the 1st June, 1934, is estimated to have amounted to about 600,000 cases unsold, with an additional 500,000 cases sold, but not shipped. It is expected that the 1934 production will be restricted to about the same quantity as last year, *viz.* 8 to 8½ million cases, but much will depend on the reaction of demand to prices. The capacity of the Hawaiian canneries is about 20 million cases, and restriction of output has been secured not only by strict allocation to each factory, but by confining the acreage under cultivation to the best land and a stricter selection of the fruit used.

Pineapple Canning in Formosa.

Further progress in pineapple canning in Formosa is indicated by the estimates of the output in the year 1933. The industry is at present of little importance in world markets other than Japan, but it has expanded rapidly in recent years. Much attention has been given to research with a view to an improvement of quality which would make possible the development of foreign markets, and a system of grading and inspection of exported fruit is in operation.

According to a report received from official sources the area under pineapple cultivation in 1933 was estimated at 15,800 acres, or an advance of 10 per cent. as compared with the total of 14,400 acres in 1932. The area has doubled since 1928, when the total was 7,400 acres, and the acreage of 5,200 for 1925 has been trebled.

The increased proportion of the superior varieties in the total area is significant. In 1928 the common or indigenous varieties occupied 6,900 acres and the better or imported kinds 490 acres, or under 7 per cent. By 1932 the native sorts had increased to an estimated figure of 10,500 acres and the superior type (smooth Cayenne and Sarawak) to 3,800 acres, or 27 per cent. of the total area. The proportions were, however, unchanged in 1933, the estimated area of the native varieties being 11,600 acres (73 per cent.) and of smooth Cayenne and Sarawak 4,200 acres (27 per cent.). Production rose from 11 million fresh pineapples in 1924 to an estimated total of 96 million in 1932, and the estimated figure for 1933 is 124 million. The quantity of pineapple packed in 1933 is estimated at 45 million cans, or 10 million cans more than in 1932 and more than four times the 1927 total.

Shipments are made all the year round, but chiefly in the period June to November, the months of July and August being the period of maximum export.

The greater part of the annual production of canned pineapple is shipped overseas, mainly to Japan. Consignments to other markets have in the past

been of negligible proportions, but increasing quantities are being sent to foreign countries.

Under semi-official encouragement, a Joint Sales Company was registered with the object of controlling the production of Formosan canned pineapple and of influencing prices in Japan to which the bulk of the exports are shipped. Shares were held by almost all the factories in the island and the company commenced operations in January, 1932. Under the terms of the agreement, supplies of raw material were to be assigned to member companies in proportion to their productive capacity, and members were to be required to sell their produce through the company. The small packers exported their goods to Japan through the company, but some of the largest Japanese controlled companies which had already established selling organisations in Japan were granted special privileges. The companies exported as before, paying a small fee in respect of each case shipped. The result was that only some 60 per cent. of the annual Formosan output actually passed through the hands of the Joint Sales Company, the remaining 40 per cent., in which was included most of the better grade produce, being exported direct by some half-dozen of the larger concerns having their own branches or agencies in Japan. This freedom of the few large Japanese-managed concerns to negotiate their own sales resulted in confusion and competition in prices and losses to the regular members of the Joint Sales Company, and the discriminatory treatment is reported to have led to considerable friction. Although the matter was temporarily smoothed over, the small companies were not satisfied and the Formosan Government, admitting some justification for their point of view, undertook to investigate the possibilities of a more satisfactory arrangement.

The Government has now produced a plan for amalgamating the 80 canneries in the island into one large concern, and an official tour of inspection of all factory premises has been concluded, with a view to assessing the value of each business. It is understood that there is a considerable amount of opposition to the scheme, but at a general meeting of the Canners' Trade Association held at the end of February, 1934, an executive committee consisting of factory representatives and growers was appointed to discuss details of the proposed amalgamation.

The opposition is reported to be mainly from canners of small importance and the suppression of their separate activities by merger may, it is believed, ultimately benefit the industry by the removal of poor quality fruit from the market. There seems little doubt that the Formosan Government holds it to be highly desirable for the future development and prosperity of the industry that a monopolistic concern capable of exercising real and effective control over production, quality, and prices in all grades should be set up, and it is expected that the new organisation will take this form. In its suggested united and reorganised form, the industry entertains high expectations of gradual expansion in foreign markets throughout the world, more especially in China and Europe.

THE COCONUT INDUSTRY AND THE EXCISE TAX.

The following abstract of an article by E. M. Shelton, published in The American Chamber of Commerce Journal of the Philippine Islands, Vol. XIV, No. 12. December 1934, traces the principal reasons for the rise in price of Philippine copra towards the end of the year 1934. Although the article is written from the Philippine standpoint, nevertheless, the reasons advanced for the improved market price of copra and coconut oil apply also to the produce of other countries.

To understand what has recently taken place in the copra market it is necessary to review briefly the gyrations of the market during the seven months the industry has operated under the American processing tax.

During the first quarter of the year 1934 and prior to the passage of the tax, both copra and oil markets were dull with prices subnormal as a result of purely natural causes. When the processing tax became law, the market price of copra started to decline quite steadily and with only minor fluctuations, and late in June reached the record low price of $1.12½ gold per 100 lbs. c.i.f. Pacific coast.

In retrospect it now seems that this price, which was either near, or in some cases, actually below the cost of production, was largely a psychological product of the tax. Nobody knew with any degree of certainty what would arise from the welter of new possibilities created by the tax and hence nobody wished to assume commitments. The American market was distinctly in the doldrums and buyers refused to operate. Since the Philippine market is chiefly dependent upon American support, the local copra and oil markets reflected the fear of American operators and hence this market was artificially depressed below the world market—below real and intrinsic value. This was the first phase of the post-tax market, a condition created by fear and uncertainty.

At this point European buyers commenced to take advantage of an exceptional opportunity. It will be remembered that American buyers of coconut oil and copra must perforce fill their requirements in the Philippines, unless they are prepared to pay the difference of $.02 gold per pound on oil made from foreign copra—manifestly impossible. European buyers, faced with no such necessity, were still free to buy in the cheapest market.

In May, Europe awoke to the fact that Philippine copra was 10 to 15 per cent. cheaper than any other world market and commenced buying on a large scale. This movement gained momentum in June and continued through July, August and September. During the months of May, June and July, the American market took a relatively insignificant quantity of Philippine copra, while Europe continued to buy on a hitherto unprecedented scale. This was the first step in recovery from the condition of fear and maladjustment growing out of the passage of the excise tax, and was to some degree anticipated. The pressure which forces commodities to flow from a lower to a higher market was being freely applied and the second phase of the crisis was over.

In July the market really started to exhibit some vitality and by the end of that month prices had actually begun to climb. At this point we come to the real crux of the recovery. In August the market was simultaneously boosted by the phenomenal drought in the Middle West and the combined effects of the Agricultural Adjustment Administration (AAA) crop destruction and acreage restriction schemes. Hogs were slaughtered, livestock perished and grains, cereals and cotton were either destroyed by the drought or reduced under the AAA. Meantime Europe continued buying Philippine copra, and these forces, powerful individually, were quite irresistible when combined, supplying the market with a powerful lift. By late August the market had definitely recovered with sales of copra at $1.375 gold Pacific coast.

In September, American buyers finally awoke to the realization that as they must perforce cover their requirements in the Philippines—or pay a penalty of $.02 gold per pound (on oil)—and as the supply of Philippine copra was not inexhaustible, and Europe already having made tremendous inroads on the 1934 production, they would *have to enter the market* or see part of their supplies move to Europe.

This paved the way for that extraordinary rise in prices which elicited much comment. Copra prices soared in six weeks from around $1.35 gold Pacific coast to a maximum of $1.75 gold recorded early in October. This unusual flurry, which developed a highly speculative interest toward the end, was followed by a slight recession in October when the artificial quality of the later advance became apparent, but as this is written the market is again advancing under the influence of the recent typhoons and reported damage in producing areas.

So much for perspective. The significant result is that the oil and copra markets actually stand some 20 to 30 per cent. higher today than they did in the first quarter of 1934, and immediately prior to the imposition of the tax.

It would be easy to jump to the superficial conclusion that a complete recovery from the effects of the excise tax has been consummated. Such a view overlooks the fact that the rapid recovery has been made possible solely by an extraordinary chain of events which the future is unlikely to duplicate. It was the fortuitous turn of the wheel of chance which gave the coconut industry in rapid succession, unprecedented European buying, crop restriction, crop destruction and artificial price raising by various governmental agencies, and lastly a drought in the Middle West of devastating severity.

Rising prices of fats and oils in America have nullified the effects of the $.03 gold per pound excise tax as, while copra and coconut oil have risen only moderately during the year 1934, the price of lard and cottonseed has doubled, and tallow has advanced more than 60 per cent. The excise tax on coconut oil has therefore been absorbed by this general price advance of domestic fats and oils.

The present condition being largely artificial, prices will not be artificially maintained for ever. Already there is talk of abandoning the price-raising policy, so that sooner or later prices will be left to natural laws. The American buyer will then quickly discover that coconut oil plus the tax will once more cost more than domestic fats and oils and the Philippine producer will begin to feel the effects of the tax. Normal times and normal prices will result in a substantial reduction of coconut oil exports to America.

The effect of the processing tax has been to shut out Philippine oil and copra, while the American buyer has been compelled to satisfy needs by substitutes from various parts of the world—tallow from Australia under the relatively low tax of ½ cent gold per pound, and coconut oil free fatty acids from Europe under a duty of only 25 per cent. *ad valorem* (about 1/3rd of the excise tax).

These fatty acids from Europe are in large part from Philippine copra, so that when Philippine exports of copra to America fell from 208,493 metric tons in 1933 to 120,194 metric tons for the first 10 months of 1934, Philippine exports to Europe simultaneously jumped frm 88,663 metric tons in 1933 to 138,620 metric tons for the first 10 months of 1934, and the copra which America is vainly trying to keep out by an excise tax, now moves to Europe where some of it replaces the tallow which Europe now sells to America, and some goes into fatty acids for the American market.

Simply stated, the United States by penalizing copra imports has caused the rest of the world to buy more copra, while simultaneously the rest of the world sells to the United States tallow, fatty acids and other substitutes which are cheaper, duty included, than copra plus the tax. Most of this change in the normal flow is unnatural and expensive.

Reviews.

Groundnut Products.

Prepared by the Intelligence Branch of the Imperial Economic Committee, H.M. Stationery Office, London, October 1934, 241 pp. Price 4s. net.

An appreciation of the world position regarding any one vegetable oil product necessitates consideration of other vegetable oils. With modern processing methods, vegetable oils are very largely interchangable, so that fluctuation in supplies coming into the market of any one raw material for oil production not only influences the price of that product, but of competing raw materials.

The statistical survey of world production and consumption of oilseeds and nuts was originally undertaken by the Empire Marketing Board, and when that body ceased to exist, this valuable work was continued by the Intelligence Branch of the Imperial Economic Committee, which is responsible for the present publication, which deals exhaustively with the production and trade in the British Empire and foreign countries of groundnut products.

Three volumes are now available in this series which constitutes a survey of oilseeds and vegetable oils. Volume I deals with oil palm products, volume II with coconut palm products, and the third volume with groundnut products. It is to be hoped that further volumes are to be prepared dealing with the other important oilseeds and vegetable oils.

The area cultivated with groundnut in Malaya is not large, but the groundnut oil market is of considerable interest. In the first place, these products are imported into Malaya in large quantities (the net imports in 1934 of the oil were 6,113 tons and of the nuts 14,357 tons, to a total value of $2,281,370), and the influence, both local and in the world markets, of these products is not without considerable effect on the market for coconut and palm oils, which are produced in this country in large quantities. The present contribution to the literature on vegetable oil products is deserving of study by those interested in any of the crops which come under this category.

D. H. G.

Some Agricultural Enterprises in Malaya.

M. J. Kennaway. Published by The Straits Times Press, Ltd, Singapore. 132 pp., 32 illustrations. 1933—34. Price $2.50.

The author presents a series of thirteen essays recounting visits to some of the well-known centres of agricultural enterprise and research in Malaya. They include accounts of the forestry method of rubber planting as practised on Cetor and Kirby Estates in Negri Sembilan, the history and results of bud-grafting rubber on Prang Besar Estate, Selangor, the Dunlop Estates and organisation in Malaya and the system obtaining on one of the largest oil palm estates in Malaya—Ulu Remis Estate, Johore, besides visits to experimental centres and to Cameron Highlands.

The last two essays touch on green manuring and the Planters Benevolent Fund 1933 Report. They appear to be somewhat out of place in a book such as this which otherwise is devoted to descriptions of planting enterprises in Malaya and to personal observation thereon.

In a Foreward, Dr. H. A. Tempany, Director of Agriculture, states:— "There is in Malaya a large output of technical and semi-technical literature on agricultural subjects particularly in the publications of the Department of Agriculture and of the Rubber Research Institute. This naturally tends to express the viewpoint of the specialist and the trained scientific agricultural worker; on the other hand, the planters' point of view is not so often seen presented in ordered form in print.

"This point of view has, however, its own considerable importance. In producing this work Mr. Kennaway has rendered a useful service; he has brought to the notice of the public many agricultural developments and planting enterprises which might otherwise remain but little known and has recorded his impressions thereof as a practical planter."

The reader will probably be most impressed by the account of the Dunlop organisation in Malaya. It is an informative article on a subject about which most readers will have little or no knowledge.

The illustrations throughout the volume have much to commend them. They are large, well-produced and give a vivid insight into the agricultural enterprises described by the author.

D. H. G.

Departmental.

FROM THE DISTRICTS.

Compiled by the Chief Field Officer from Monthly Reports submitted by Field Officers.

The Weather.

Throughout the Peninsula the weather was hot and dry for the greater part of the month, but showers became more frequent in most parts of the country in the third or fourth week. Even on the western side, where dry conditions are normal in February, the rainfall was on the whole below the average, while on the east coast the deficiency was much more pronounced.

Remarks on Crops.

Rubber.—Prices in most centres were steady and showed no marked variation from those of January. In Selangor there was an increase in price of coupons without rubber, which at $14 per picul exceeded the price of $12 per picul for rubber not covered by coupons.

The heavy and uniform wintering was nearly completed by the end of the month and in several parts of the country the new foliage was developing rapidly. The reduction in export rights has led some owners of small holdings to rest their trees during the wintering period, especially in areas where the padi harvest is in progress; while in other parts more conservative tapping systems have been adopted. These factors and the dry weather are reported to have led to a decline in crop.

The conditions described greatly reduced the incidence of mouldy rot disease. Attacks of *Oidium Heveae* on the young foliage were reported from south and central Kedah, Province Wellesley South, Perak South, Selangor, Negri Sembilan, Malacca and Northern Johore, but in most cases these attacks were mild.

Padi.—Padi harvest progressed rapidly under favourable conditions in Kedah, Province Wellesley and Penang, Krian and most other parts of Perak, Negri Sembilan except Jelebu District, Malacca, Raub and the road mukims of Lipis in Pahang, Kelantan and Northern Johore. By the end of the month work was practically completed in North Kedah, Province Wellesley North, Upper Perak, Tampin, Rembau, Seremban, most parts of Malacca, Raub, the road mukims of Lipis, and northern Johore except at Tangkah.

In Kedah it is confirmed that the crop is likely to be considerably below that of last season owing to adverse weather conditions. In Kelantan, on the other hand, the crop is expected to be the best obtained for some years. In Krian and Province Wellesley the general prospects for the crops remain good, if the fine weather continues. The crop in Upper Perak was again good, but in other

parts of the State planting has been irregular and some of the riverine mukims have suffered from flood damage, so that prospects are variable. In Western and Central Pahang and the inland areas of Malacca the crop on the whole is good, but late planting and dry weather are expected to cause an almost complete loss in some of the coastal areas of Malacca. In Negri Sembilan the crop should be fair.

There has been keen competition among buyers for the new crop in Krian with a consequent rise in the local price. A tendency to speculation has been manifest in that stocks are being held in the hope of a further rise. A slight improvement in the price of padi is recorded generally throughout the country. In Malacca growers have sold considerable quantities of padi to rice dealers in the town at prices between $1.80 and $2 per picul.

The new rice mill at Temerloh was officially opened by H.H. the Sultan of Pahang on the 28th February. In the trial runs a fairly good quality of rice was obtained. The Co-operative Societies Department in Kedah has commenced the erection of a rice mill near Alor Star, equipped with the latest type of machinery and having a capacity of 20 bags of rice a day.

Coconut and Copra.—Copra prices declined steadily during the first half of the month from $4.80 per picul in Penang to $4.55. Subsequently they rose again to $5.10 per picul. Local prices for both copra and nuts have fluctuated in accordance with the Penang or the Singapore market, but a seasonal shortage of nuts, which may be more pronounced this year than is usual, has enhanced local prices in areas where there are oil mills, as for example the Coast Districts of Selangor and Malacca where prices for copra ranged from $4.40 to $5 per picul. The shortage of nuts is reflected in the rise in the price of nuts for domestic use in some of the inland districts where they have varied from 3 to 5 cents each. It is also shown by the rise in price of home-made coconut oil from an average in January of about 11 cents per bottle to figures ranging from 14 to 20 cents per bottle in different localities.

Pineapples.—In Singapore fruits were not so plentiful as in January and factories were working to a reduced output.

Tobacco.—In Kedah some 56 acres were planted with tobacco during the month and in Pahang small areas were planted near Jerantut and Pekan. In most parts of the country prices for dried leaf ranged from $20 to $50 per picul according to quality, but in Perak a shortage of supplies, possibly due to the failure of the crop in the recent dry weather, caused a considerable rise in price, first quality leaf fetching $45 to $82 per picul in different parts of the State. In Pahang West the price at $55 to $60 per picul was also above the average.

Tuba.—Some 240 acres have recently been planted with this crop on an estate in Pahang. There was a continued large demand for planting material from the Changi area of Singapore Island, as a result of which the supply is reported to be rapidly nearing exhaustion.

Cloves.—The clove harvest was completed in Penang Island during the month and dried cloves were sold in Georgetown for as high a price as $45 per picul.

Agricultural Stations and Padi Test Plots.

The continued spell of dry weather hindered planting operations on the Agricultural Stations. Work was, therefore, mainly confined to harvesting certain temporary crops, routine maintenance and the preparation of land for replanting temporary crops. Felling and burning were completed on the site of the new Agricultural Station in Raub District. The area was fenced and four main drains were dug. Clean clearing and levelling were in progress.

Harvest was finished at the Padi Experiment Stations in Kedah, Krian and Kelantan and on a number of Padi Test Plots. Preliminary results show that the Malacca strain Siam 29 again did well at the Briah Test Plot in Krian, Kendong in Negri Sembilan, Lipis and Dong in Pahang and Pasir Puteh in Kelantan. This strain has now clearly proved its adaptability to different conditions and its high-yielding power, in consequence of which it is becoming popular in several parts of the Peninsula. Its main defect is its somewhat weak straw. A new strain Milek Kuning 3, selected in Malacca from a variety popular in the Pekan District of Pahang, gave good results at Kendong and on the Lipis, Dong and Temerloh Plots in Pahang. At Lipis it yielded at the rate of 588 gantangs and at Dong at the rate of 562 gantangs per acre. It has a maturation period of about 7½ months and possesses the desirable character of strong straw. Reyong 20, a recent selection from a variety popular in Kedah, also gave promising results on the two Pahang plots with yields of approximately 450 gantangs per acre. At Lipis the local padi yielded at the rate of 350 gantangs per acre only as compared with yields between 450 and 580 gantangs from the four best pure strains, while at Dong no less than 11 strains gave yields between 450 and 600 gantangs per acre as compared with 317 from the local variety. In spite of the fact that wet weather in January caused much of the crop to lodge on the Lenggong Plot in Upper Perak, yields were again remarkably high, some of the Radin strains giving as much as 900 gantangs per acre.

Instructional Tour.

A second party of nine Penghulus and fifty Malay agriculturists from the Temerloh and Bentong Districts of Pahang paid a three days visit to Malacca at their own expense under the guidance of the Malay Agricultural Assistant, Pahang South An instructional programme was arranged for them by the Agricultural Officer, Malacca, on the same lines as that arranged for the party which visited Malacca in January.

Rural Lecture Caravan.

The tour of the Rural Lecture Caravan in Selangor, which was commenced at the end of January, was continued in the Klang and Kuala Selangor Districts at the beginning of February. The centres visited were Telok Gadong, Bukit Naga, Rantau Panjang, Jeram, Assam Jawa and Kampong Kuantan. At the cinema shows and evening lectures illustrated by lantern slides the attendances varied from 400 to 1,000 people. The afternoon lectures were attended by fewer people, some 50 to 100, but the intention of these lectures is to appeal mostly to those particularly interested in the subjects dealt with and to give them more detailed demonstrations and information than is possible when addressing a large audience.

Poultry Diseases.

Outbreaks of poultry diseases were reported from Batu Gajah in Perak early in the month and from the mukims of Lipis and Penjom in Pahang in the second half of the month. These were investigated by officers of the Veterinary Department. No information as to the nature of the disease in either case has yet been received. It is noteworthy that, as has been observed on a number of previous occasions, these outbreaks coincided with a spell of unusually dry weather.

DEPARTMENTAL NOTES.

Return from Leave of the Adviser on Agriculture

The Hon'ble Dr. H. A. Tempany, C.B.E., Director of Agriculture, Straits Settlements, and Adviser on Agriculture, Malay States, returned from leave on 22nd February, 1935.

Visits of the Adviser on Agriculture.

The Acting Adviser on Agriculture (Mr. F. W. South) visited Cameron Highlands from 2nd to 5th February. He inspected the Experimental Station, Tanah Rata, visited Boh Plantations and certain other properties and attended the Annual General Meeting of the Cameron Highlands Society on 4th February.

The Adviser on Agriculture (Dr. H. A. Tempany, C.B.E.) attended the opening of the Temerloh Rice Mill on 28th February.

Leave.

Mr. N. C. E. Miller, Assistant Entomologist, has been granted 8 months and 21 days full pay leave from 10th February to 30th October, 1935, inclusive.

Mr. V. Dawson, Senior Lecturer, School of Agriculture, Malaya, has been granted 8 months and 7 days full-pay leave from 1st March 1935 to 7th November 1935 inclusive.

Mr. E. A. Curtler, Agricultural Officer, has been granted 10 months and 19 days full pay leave from 2nd March 1935 to 20th January 1936 inclusive.

Mr. G. E. Mann, M.C., Vice-Principal, School of Agriculture, Malaya, returned from leave on 14th February, 1935.

Transfers.

Attention is drawn to the Staff List on the inside front cover of this number. Several transfers are recorded in the Field Branch in consequence of the return from leave of various officers.

Publications of the Department of Agriculture.

Attention is drawn to two recent special publications of the Department. They are as follows :—

The Oil Palm in Malaya by B. Bunting, C. D. V. Georgi and J. N. Milsum, Malayan Planting Manual No. 1. Price $2, post free.

The Toxic Value of *Derris* spp. by N. C. E. Miller, Special Bulletin, Scientific Series No. 16. Price 50 cents, post free.

Statistical.

MARKET PRICES.

February, 1935.

Rubber.—There was little fluctuation in the price of rubber during February, extremes being 20⅜ and 21½ cents per lb. for spot loose in Singapore. The market strengthened during the month but average prices were slightly lower than in January, No. 1. X. Rubber Smoked Sheet averaging 21.10 cents per lb. as compared with 21.25 cents per lb. in the previous month. The average price in London for January was 6.30 pence per lb. and in New York 12.79 cents gold per lb. as compared with 6.39 pence and 13.01 cents gold in January.

The following table shews weekly prices paid at three centres during the month for small-holders' rubber.

Table I.
Weekly Prices Paid By Local Dealers for Small-Holders' Rubber, February, 1935.

(Dollars per Picul.)

Grades.	Kuala Pilah, Negri Sembilan.				Kuala Kangsar, Perak.				Batu Pahat, Johore.		
	7	14	21	28	6	13	20	27	13	20	28
Smoked sheet	23.50	23.50	25.24	24.54	23.74	25.71	24.39	27.07			
Unsmoked sheet	21.10	22.14	22.57	23.09	21.31	23.00	21.25		20.97	20.10	22.74
Scrap		15.00								18.00	

Transport by lorry Kuala Pilah to Seremban 15 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang $1.24 per picul, Seremban to Singapore $8.00 per ton.

Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.

Transport from Kuala Kangsar to Prai by railway $6.20 per ton.

Transport from Kuala Kangsar to Singapore by railway $10.00 per ton (minimum consignment 5 tons).

At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.

At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent.

No purchases at Batu Pahat on 6th February, 1935.

Palm Oil.—The market continued its steady upward trend as is shewn by the following table of quotations in February for Malayan palm oil and kernels.

Table II.

Prices of Palm Oil and Palm Kernels.

Date 1935.	Palm Oil in Bulk, c i.f. landed weight Liverpool/ Halifax.	Palm Kernels, c.i.f. landed weight London/ Continent
	per ton	per ton
Feb. 1	£ 20. 0. 0	£ 8. 12. 6
,, 8	21. 0. 0	8. 15. 0
,, 15	22. 0. 0	8. 15. 0
,, 22	23. 17. 6	9. 0. 0

Copra.—Prices again advanced very considerably in Singapore reaching a peak of $4.85 per picul for the sun-dried grade, which price was maintained at the close of the month. The average price for February for this grade was $4.60 per picul as compared with $4.21 in January. The mixed quality also rose, closing at $4.60 per picul, with an average for the month of $4.40 per picul, as against $3.91 in January.

Copra cake fell away slightly at the close of the month, averaging $1.95 per picul as compared with $2.25 in January.

Rice.—The average wholesale prices of rice per picul in Singapore during January were as follows:—Siam No. 2 (ordinary) $3.11, Rangoon No. 1 $2.89, Saigon No. 1 $3.02 as compared with $2.95, $2.86 and $2.95 in the previous month. Corresponding prices in January 1934 were:—$2.91, $2.72 and $2.65.

The average retail market prices in cents per gantang of No. 2 Siam rice in January were:—Singapore 22, Penang 20, Malacca 22, being the same as in December 1934.

The average declared trade value of imports of rice in January was $3.26 per picul as compared with $3.28 in December and $3.25 in November.

Padi.—The Government Rice Mill, Bagan Serai, continued to raise its price for padi, and was paying $2 per picul at the close of February. The privately owned mill was reported to have raised its price similarly. Prices per gantang varied in different parts of the country from 4½ to 12 cents. In Kedah the price rose to 16 cents per gantang.

Tea.—Malayan tea was well represented on the London market in January. Two consignments of Kedah tea were sold at an average price of 10¾d. per lb. on each occasion. Boh Plantations tea was sold at an average of 11¼d. per lb. and a consignment from the Government Experiment Station at Tanah Rata averaged 11¾d. per lb. Average London prices per lb. paid during January for tea consignments from other countries were as follows:—Ceylon 1s. 1.53d., Java 10.02d., Indian Northern 11.86d., Indian Southern 11.69., Sumatra 9.14d.

The latest available London average prices (7th February 1935) are 1s. 2d., 9.51d., 1s. 0.02d., 11.50d. and 8.91d. respectively. Kedah and Boh Plantations teas were sold at 10¾d. and 11d. per lb. respectively.

The following are the latest Colombo average prices available and are quoted from the Weekly Tea Market Report, 9th February, 1935, of The Colombo Brokers' Association; prices are per lb. and in rupee cents:—High Grown Teas 98 cents, Medium Grown Teas 67 cents, Low Grown Teas 54 cents.

Tuba Root (*Derris*).—The demand for tuba was greater in February than it has ever been, and, owing to the scarcity of Malayan roots, large quantities of tuba of non-Malayan origin were being marketed. The latter, sold on a basis of ether extract, averaged $30 per picul, the average price of Malayan roots on a similar basis of analysis being $34.50 per picul, as compared with $32.50 per picul in January. Good quality roots sold on rotenone content averaged $46 per picul, an increase of $1 per picul as compared with the January average. Singapore dried roots were also quoted at $70 per picul.

Coffee.—Prices weakened slightly during February in Singapore. Sourabaya coffee opened and closed at $19 to $19.50 per picul, with a fall to $18.50 to $19 in the early part of the month. Palembang coffee averaged $12.94 per picul as compared with $13.48 in January.

Local prices for coffee fell back slightly, ranging from $21 to $30 per picul is different Districts.

Arecanuts.—A considerable falling-off in the prices of the various grades of this commodity was noticeable in February. Average prices per picul in Singapore were:—Splits $4.87 to $5.87, Sliced $8.62 to $9.62, Red Whole $6 to $7, the price in each range depending upon quality.

The average prices per picul quoted by the Singapore Chamber of Commerce were: Best $6.70, Medium $6.26, Mixed $5.95.

Gambier.—Block improved slightly at the close of February but the average Singapore price per picul for the month was only $5.12 as compared with $5.44 in January. No. 1 Cube averaged $11.62 per picul as compared with $11.88 in the previous month.

Pineapples.—There was a scarcity of fresh fruit in February coupled with a lack of buying enquiry, and prices remained almost unchanged. Average prices per case shewed some improvement over those of January; they were: Cubes $3.45, Sliced Flat $3.17, Sliced Tall $3.40, as compared with $3.29, $3.14 and $3.35 in January.

Local average prices of fresh fruits per 100 were:—Singapore $3 and $2 for large and small sizes respectively; Selangor $2 to $2.50 for first quality and $1 to $2 for second quality.

Tapioca.—There was a slight improvement in the Singapore market in February, with the exception of Seed Pearl which fell 5 cents per picul. Average prices per picul were:—Flake Fair $3.75, Seed Pearl $5.47, Medium Pearl $6, as compared with $3.50, $5.50 and $5.85 respectively in January.

Sago.—Poor demand was responsible for a dull market in this commodity during February, though an improvement occurred at the close of the month. Pearl, Small Fair, averaged $3.77 per picul and Flour, Sarawak Fair, averaged $2.41 per picul. The January respective averages were $3.98 and $2.55.

Mace.—Siouw improved to $110 per picul at the close of the month, averaging $95 per picul as compared with $90 in January. Amboina, on the other hand, fell $5 per picul, to average $66.25 as compared with $67.50 per picul in the previous month.

Nutmegs.—Prices in Singapore opened in February at a higher level and remained unchanged throughout the month. 110's were quoted at $27.50 per picul and 80's at 28.50 per picul, as compared with $25.50 and $26 respectively in January.

Pepper.—The crisis in the London pepper market resulted in quotations in Singapore being purely nominal, with no business passing. Averages of quotations per picul were:—Singapore Black $18.25, Singapore White $51.50, Muntok White $53.50. January average prices per picul were $20.38, $62, and $64 respectively.

Cloves.—Prices continued nominal in Singapore at Zanzibar $35 and Amboina $45 per picul.

Tobacco.—Local prices varied considerably in different parts of the Peninsula, and in Perak rose as high as $82 per picul. Average price ranges were $20 to $50 per picul, but in Pahang prices were $55 to $60 per picul.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for coffee and arecanuts by the Lianqui Trading Company of Singapore, and tuba prices by Messrs. Mackay & Co., Singapore.

1 picul = 133⅓ lbs. The Dollar is fixed at two shillings and four pence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57, Charing Cross, London, S.W.1.

GENERAL RICE SUMMARY.*

January, 1935.

Malaya.—Imports of foreign rice into Malaya during January were 59,928 tons and exports 18,217 tons, net imports being 41,711 tons an increase of 19.7 per cent.†

Of the January imports 55 per cent. were consigned to Singapore, 16 per cent. to Penang, 7 per cent. to Malacca, 18 per cent. to the Federated Malay States and 4 per cent. to the Unfederated Malay States. Of the total 65 per cent. came from Siam, 30 per cent. from Burma, 4 per cent. from French Indo-China and 1 per cent. from other countries.

Of the exports during January, 70 per cent. were consigned to the Netherlands Indies and 30 per cent. to other countries. The various kinds of rice exported were :—Siam 12,574 tons (69 per cent.), Burma 4,586 tons (25.2 per cent.), French Indo-China 289 tons (1.6 per cent.), India 25 tons (0.1 per cent.), local production 743 tons (4.1 per cent.).

India and Burma.—Foreign exports for the year 1934 totalled 1,383,000 tons, a decrease of 24.4 per cent. as compared with 1,829,000 tons in 1933.

According to the Final Forecast of the Rice Crop in Burma for the season 1934-35 dated 15th February, 1935, the area likely to mature is estimated at 12,307,100 acres, a decrease of 157,200 acres or 1.5 per cent. as compared with the final figures for the season 1933-1934. Production is estimated at 6,800,000 tons of padi, a decrease of 12.6 per cent. as compared with the previous season. The surplus of rice and rice products available for export is estimated at 3,200,000 tons.

Siam.—Exports of rice from Bangkok during December were 190,915 tons, making a total of 1,907,151 tons for the year as compared with 1,584,288 tons in 1933.

According to the First Forecast of the Rice Crop of Siam for the season 1934-35, the total area planted in all the provinces of the Kingdom is estimated at 8,560,000 acres, total production at 64,800,000 tons of rice and rice products, and the surplus available for export at 1,900,000 metric tons.

Japan.—According to the Ministry of Agriculture and Forestry (*Trans-Pacific Journal,* 31st January, 1935), production of rice for 1934 amounted to 7,270,635 tons, a decrease of 26.8 per cent. as compared with the previous year.

The demand and supply for the 1934-35 rice year, on the basis of the 1934 production are as follows :—

Supply :	Balance 1933-34 rice year	...	2,299,000 tons.
	Rice crop 1934	...	7,271,000 ,,
	Imports	...	1,893,000 ,,
Demand :	Estimated consumption	...	9,958,000 ,,
	Estimated exports	...	60,000 ,,

shewing a surplus of 1,445,000 tons.

---

* Abridged from the Rice Summary for January, 1935, compiled by the Department of Statistics, Straits Settlements and Federated Malay States.

† It is to be understood throughout the summary that all comparisons and percentage increases or decreases are in relation to the corresponding period of 1934.

French Indo-China.—Entries of padi into Cholon during January were 158,537 metric tons, an increase of 120.5 per cent. as compared with the previous year.

Exports of rice for the month were 135,066 metric tons, an increase of 42.6 per cent.

The Netherlands Indies.—No further information is available since the December summary.

Ceylon.—Imports during January were 46,510 tons, an increase of 3.15 per cent. as compared with the previous year. Of the January imports, 11.1 per cent. were from British India, 75 per cent. from Burma, 1.6 per cent. from the Straits Settlements and 12.3 per cent. from other countries.

Europe and America.—Shipments to Europe from the East for the period 1st to 24th January, 1935, amounted to 50,345 tons, an increase of 49.1 per cent. as compared with 1934.

Of the 1935 shipments 6.3 per cent. were from Burma, 78.7 per cent. from Saigon, 14.9 per cent. from Siam and 0.1 per cent. from Bengal. The 1934 percentages were 10.6, 75.9, 13.5 and nil respectively.

Shipments from the East to the Levant for the period 1st January to 29th December, 1934, totalled 29,424 tons, an increase of 22.2 per cent. as compared with 1933.

Shipments to the West Indies and America for the year 1934 amounted to 198,196 tons, an increase of 19.8 per cent. as compared with 165,452 tons in 1933.

MALAYAN AGRICULTURAL EXPORTS, JANUARY, 1935.

PRODUCT.	Net Export in Tons.		
	Year 1934.	January 1934.	January 1935.
Arecanuts ...	18,882	3,612	2,768
Coconuts, fresh † ...	100,826†	6,515†	7,152†
Coconut oil ...	25,485	1,763	2,504
Copra ...	95,618	9,263	11,186
Gambier, all kinds ...	2,170	173	240
Oil cakes ...	11,273	1,183	923
Palm kernels ...	3,196	160	345
Palm oil ...	15,852	297	1,265
Pineapples canned ...	66,633	4,667	4,468
Rubber ¶ ...	479,371¶	41,773¶	38,327¶
Sago,—flour ...	10,503	1,525	1,907
,, —pearl ...	6,177	255	503
,, —raw ...	7,079*	464*	696*
Tapioca,—flake ...	5,761	649	237
,, —flour ...	1,842*	184*	263*
,, —pearl ...	15,770	1,099	959
Tuba root ...	481	44½	41

† hundreds in number. * net imports. ¶ production.

MALAYA RUBBER STATISTICS

ACREAGES OF TAPPABLE RUBBER NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING 31ST JANUARY, 1935.

STATE OR TERRITORY	Acreage of Tappable Rubber end 1933 (*d*)	ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING (*a*)		AREA OF TAPPABLE RUBBER NEVER BEEN TAPPED		Total (3) + (5)	Percentage of (9) to (2)
		Acreage	Percentage of (3) to (2)	Acreage	Percentage of (5) to (2)	Acreage	Percentage of (7) to (2)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
STRAITS SETTLEMENTS :—									
Province Wellesley	44,285	320	.7	7,976	18.0	567	1.3	8,296	18.7
Dindings	7,368	112	1.5	670	9.1	139	1.9	782	10.6
Malacca	121,152	135	.1	15,435	12.7	2,642	2.2	15,570	12.8
Penang Island	1,366	126	9.2	444	32.5	144	10.5	570	41.7
Singapore Island	28,842	1,650	5.7	6,336	22.0	772	2.7	7,986	27.7
Total S.S. ...	203,013	2,343	1.2	30,861	15.2	4,264	2.1	33,204	16.4
FEDERATED MALAY STATES :—									
Perak	253,227	2,439	1.0	37,708	14.9	15,069	6.0	40,147	15.9
Selangor	310,003	4,100	1.3	43,139	13.9	13,030	4.2	47,239	15.2
Negri Sembilan	233,592	5,834	2.5	29,313	12.5	15,375	6.6	35,147	15.0
Pahang	46,712	4,252	9.1	15,840	33.9	10,773	23.1	20,092	43.0
Total F.M.S. ...	843,534	16,625	2.0	126,000	14.9	54,247	6.4	142,625	16.9
UNFEDERATED MALAY STATES :—									
Johore	365,400	7,670	2.1	24,408	6.7	19,537	5.3	32,078	8.8
Kedah (*b*)	126,588	1,798	1.4	28,886	22.8	19,591	15.5	30,684	24.2
Kelantan	25,793	4,116	15.9	976	3.8	5,084	19.7	5,092	19.7
Trengganu (*b*)	4,543	Nil	Nil	98	2.2	98	2.2	98	2.2
Perlis (*c*)	1,181	Nil	Nil	543	46.0	Nil	Nil	543	46.0
Brunei	(*d*) 4,991	Nil	Nil	1,372	27.5	875	17.5	1,372	27.5
Total U.M.S. ...	528,496	13,584	2.6	56,283	10.6	45,185	8.6	69,867	13.2
TOTAL MALAYA ...	1,575,043	32,552	2.1	213,144	13.5	103,696	6.6	245,696	15.6

Notes :—(*a*) Area out of tapping on Estates which have partly ceased tapping refers to areas definitely being rested and excludes areas on any tapping round.
(*b*) Registered Companies only.
(*c*) Rendered quarterly.
(*d*) Figures are as reported by estate managers.

MALAYA RUBBER STATISTICS — TABLE I

STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERTEX, FOR THE MONTH OF JANUARY, 1935 IN DRY TONS.

State or Territory 1	Stocks at beginning of month 1			Production by Estates of 100 acres and over		Production by Estates of less than 100 acres estimated 2		Imports				Exports including re-exports				Stocks at end of month		
								during the month		January 1935		during the month		January 1935				
	Ports	Dealers	Estates of 100 acres and over	during the month	January 1935	during the month	January 1935	Foreign	From Malay States & Labuan	Foreign	From Malay States & Labuan	Foreign	Local	Foreign	Local	Ports	Dealers	Estates of 100 acres and over
MALAY STATES :—	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Federated Malay States ...	...	8,202	7,057	13,165	13,165	6,339	6,339	Nil	Nil	Nil	Nil	†17,935		17,935				
Johore ...	...	1,991	2,224	4,203	4,203	4,508	4,508	Nil	43	Nil	43	‡8,882	†3,212	8,882	3,212		12,738	9,923
Kedah ...	...	262	1,506	3,080	3,080	1,202	1,202	Nil	Nil	Nil	Nil	2,237	4,787	2,237	4,787	...	2,822	3,123
Perlis ...		12	27	23	23	10	10	Nil	Nil	Nil	Nil	1,790	1,834	1,790	1,834	...	366	2,060
Kelantan ...	...	161	173	320	320	430	430	Nil	Nil	Nil	Nil	Nil	33	Nil	33	...	18	21
Trengganu ...	...	55	50	196	196	98	98	Nil	Nil	Nil	Nil	138	472	138	472	...	294	180
Brunei ...	...	7	19	55	55	59	59	Nil	Nil	Nil	Nil	Nil	294	Nil	294	...	55	50
Total Malay States	...	10,690	11,056	21,042	21,042	12,646	12,646	Nil	43	Nil	43	22,100	10,737	22,100	10,737	...	16,314	15,383
S. SETTLEMENTS :-																		
Malacca ...	...	3,450	806	1,592	1,592	1,805		Nil		Nil		3,762		3,762		...	3,443	1,090
Province Wellesley	...	2,216	434	575	575	131		Nil		Nil						...	1,695	500
Dindings ...	...	18	52	121	121	86		Nil		Nil						...	74	117
Penang ...	3,697	11,861	9	18	18	22	2,089	2,309	11,581	2,309	11,581	6,980	Nil	6,980	Nil	3,070	12,862	12
Singapore ...	7,190	39,394	162	244	244	35		12,833		12,833						5,951	37,726	193
Labuan	...	73	Nil	Nil	Nil	10		368		368		23,878		23,878		...	41	Nil
Total Straits Settlements	10,887	57,012	1,463	2,550	2,550	2,089	2,089	15,510	11,581	15,510	11,581	34,620	Nil	34,620	Nil	9,021	55,841	1,912
TOTAL MALAYA	10,887	67,702	12,519	23,592	23,592	14,735	14,735	15,510	11,624	15,510	11,624	56,720	10,737	56,720	10,737	9,021	72,155	17,295

† Ocean—shipments from Malaya of rubber directly consigned from the F.M.S. ‡ Exports of rubber from the F.M.S. during January, 1935.

TABLE II
DEALERS' STOCKS, IN DRY TONS 3

Class of Rubber 20	Federated Malay States 21	S'pore 22	Penang 23	Province We'sly D'dings M'cca. 24	Johore 25	Kedah 26
DRY RUBBER	11,636	34,781	11,471	5,003	1,857	188
WET RUBBER	1,102	2,945	1,391	271	965	178
TOTAL ...	12,738	37,726	12,862	5,274	2,822	366

TABLE III
FOREIGN EXPORTS

PORTS 27	For month 28	January 1935 29
Singapore ...	39,930	39,930
Penang ...	11,652	11,652
Port Swettenham.	4,704	4,704
Malacca ...	434	434
MALAYA ...	56,720	56,720

TABLE IV
DOMESTIC EXPORTS 4

AREA 30	For month 31	January 1934 32
Malay States ...	23,725	25,742
Straits Settlements	2,017	
MALAYA ...	25,742	25,742

Notes :—

1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.
2. The production of estates of less than 100 acres is estimated from the formula : Production + Imports + Stocks at beginning of month = Exports + Stocks at end of month, + Consumption, *i.e.*, Column [9] = Columns [15] + [16] + [19] + [20] + [21] + [22] − [4] − [5] − [6] − [7] − [11] − [12]. For the Straits Settlements, Column [9]: figures for Singapore and Penang Islands represent sales or exports as shown by cess paid and for the mainland represent as previously purchases by dealers from local estates of less than 100 acres.
3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15% wet sheet, 25% scrap, lump, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers themselves.
4. Column (31) represents domestic exports, being net exports from the mainland Labuan and Brunei, plus production as represented by sales or exports in the Islands of Singpore and Penang. Column (32) includes from January inclusive 25,742 tons rubber debitable to quota under the Rubber Regulation Agreement dated 7th May, 1934. (Figures may be subject to minor adjustment.)
5. The above, with certain omissions, is the Report published by the Registrar-General of Statistics, S.S. and F.M.S., at Singapore on 24 February, 1935.

METEOROLOGICAL SUMMARY, MALAYA, JANUARY, 1935.

Locality.	Air Temperature in degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine.		
	Means of		Mean of A and B.	Absolute Extremes				At 1 foot	At 4 feet	Total.		Most in a day.	Number of days.					Total.	Daily Mean.	Per cent.
	A. Max.	B. Min.		Highest Max.	Lowest Min.	Lowest Max.	Highest Min.						Precipitation .01 in or more	Precipitation, .04 in or more	Thunder-storm	Fog morning obs.	Gale force 8 or more			
	°F	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	in.						Hrs.	Hrs.	
Railway Hill, Kuala Lumpur, Selangor ...	90.4	70.6	80.5	94	67	84	73	83.4	84.0	4.77	121.2	1.19	11	8		3		201.60	6.50	54
Bukit Jeram, Selangor ...	88.1	71.4	79.7	93	69	80	73	83.9	84.7	5.88	149.4	2.02	14	12				288.40	7.37	61
Sitiawan, Perak ...	89.0	71.8	80.4	92	67	80	74	83.2	84.3	9.17	232.9	3.45	18	12				225.15	7.26	62
Temerloh, Pahang ...	85.1	70.0	77.5	90	64	74	73	81.1	84.2	9.06	230.1	2.01	17	16		8		194.50	6.27	53
Kuala Lipis, Pahang ...	84.3	69.0	76.7	89	63	73	73	80.9	82.7	8.43	214.1	1.80	18	14		24		163.90	5.29	44
Kuala Pahang, Pahang ...	82.5	73.5	78.0	84	69	76	78	81.1	82.8	13.99	355.4	5.54	16	15				213.05	6.87	58
Kallang Aerodrome, S'pore ...	86.0	73.4	79.7	89	70	76	76	80.0	81.7	3.72	94.5	1.04	9	9	1			192.80	6.22	51
Butterworth, Province Wellesley ...	87.9	71.7	79.8	92	67	82	75	84.1	84.4	4.01	101.9	1.26	10	10				251.90	8.13	69
Bayan Lepas Aerodrome, Penang ...	87.6	72.5	80.1	91	67	82	76	82.9	83.7	5.24	133.1	1.54	14	11	1			256.45	8.27	
Bukit China, Malacca ...	87.1	72.2	79.7	90	69	82	74	82.2	83.2	2.59	65.8	1.44	8	6				200.55	6.47	54
Kluang, Johore ...	86.5	69.7	78.1	90	64	81	72	79.9	81.3	4.77	121.2	1.80	11	9		2		200.20	6.46	54
Bukit Lalang, Mersing, Johore	82.1	71.9	77.0	85	64	77	75	79.1	79.7	11.45	290.8	2.35	19	17				204.40	6.59	55
Alor Star, Kedah ...	88.7	69.1	78.9	92	63	80	74	82.1	83.9	4.02	102.1	1.76	7	5	1			242.65	7.83	66
Kota Bahru, Kelantan ...	84.3	70.4	77.3	88	65	73	75	80.1	81.9	16.50	419.1	5.85	10	9				227.55	7.34	62
Kuala Trengganu, Trengganu	83.8	70.4	77.1	86	66	77	75	79.8	81.2	12.57	319.3	4.03	19	14		3		213.85	6.90	58
HILL STATIONS.																				
Fraser's Hill, Pahang 4268 ft.	68.9	59.5	64.2	74	56	62	63	70.4	71.1	8.92	226.6	1.48	19	14		24		157.80	5.09	43
Cameron Highlands, Tanah Rata, Pahang 4750 ft. ...	71.2	55.0	63.1	76	44	65	62	68.1	68.6	6.95	176.5	2.16	13	10				170.75	5.51	46
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft. ...	69.7	57.1	63.4	75	54	63	59			7.40	188.0	2.25	12	10				181.40	5.85	49

Compiled from Returns supplied by the Meteorological Branch, Malaya